

To: Wroble, Julie[Wroble.Julie@epa.gov]; McClintock, Katie[McClintock.Katie@epa.gov]
Cc: Downey, Scott[Downey.Scott@epa.gov]; Stifelman, Marc[Stifelman.Marc@epa.gov]; Barber, Anthony[Barber.Anthony@epa.gov]
From: Koprowski, Paul
Sent: Sat 3/5/2016 12:23:17 AM
Subject: RE: update from incident management team meeting

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>>>>>>>

Thanks Julie. I caught the same things pretty much. I would add on the since they ID'd locations for the monitors at Uroboros we should see an SAP from Chris Moore very soon. I've contacted Anthony to see what he needs. I think we're pretty tapped out in the region so if we'll have to find some from another region or somewhere else.

I also noted they were pretty proud that the final incident action plan was approved.

I'll also note that the representatives from the city, county, forest service, Portland public schools, managers, leadership and Governor's office had not "red" items worth mentioning. Gabriela (Governor's office) talked messaging about but that's mostly what the JIC is working on. I alerted Harry Craig that the data would be coming soon.

Paul

Paul Koprowski

U.S. EPA; Oregon Operations Office

805 SW Broadway, Suite 500

Portland, Oregon 97205

(503) 326-6363

From: Wroble, Julie
Sent: Friday, March 04, 2016 3:43 PM
To: McClintock, Katie
Cc: Koprowski, Paul ; Downey, Scott ; Stifelman, Marc
Subject: update from incident management team meeting

Maybe Paul has more to add:

Air Quality: Two new sites have been ID's near Uroboros, but low on equipment so not sure if work can be done. (Is this an area where EPA can help with? Paul will check for more info.

Community Engagement: 1) link has been sent out for community requests; 2)there's a draft response plan process

Environmental health/Risk assessment: Information to be released next week, Wed – DEQ's soil data for bullseye area, correlating health assessment indicating low soil levels, low risks; fact

sheet about gardening saying that it's o.k to garden. Gov office asked about why earlier message said no garden, response was that based on earlier data and with an abundance of caution, that was the recommendation 3 weeks ago. More recent data has indicated gardening to be ok.

Air sampling data release date is March 14 – Farrar needs time to review and assess prior to release.

Cancer: no elevated rates of cancer found.

Epi/surveillance: preliminary results of urine testing are available. Most ND, but few positive results for cadmium in urine need to be understood and explained.

I asked when we could see the data and was directed to Aaron Borisenko at DEQ who provided it.

I'll try to look this over today before I leave.

Julie Wroble|Acting Unit Manager, Risk Evaluation Unit|Toxicologist|USEPA Region 10|1200 6th Ave., OEA-140|Seattle, WA 98101|T: 206-553-1079|e-mail: wroble.julie@epa.gov

To: Holsman, Marianne[Holsman.Marianne@epa.gov]
Cc: Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]
From: McClintock, Katie
Sent: Fri 2/12/2016 4:13:46 PM
Subject: RE: FYI

Marianne –

I read the article this morning and noticed comments about epa without talking to us. Zach and I went to both Portland facilities this week and can help provide some technical clarifications if necessary.

From: Holsman, Marianne
Sent: Friday, February 12, 2016 8:04 AM
To: Koprowski, Paul <Koprowski.Paul@epa.gov>; McClintock, Katie <McClintock.Katie@epa.gov>; Kowalski, Ed <Kowalski.Edward@epa.gov>; Hastings, Janis <Hastings.Janis@epa.gov>; Smith, Judy <Smith.Judy@epa.gov>; Philip, Jeff <Philip.Jeff@epa.gov>; Bray, Dave <Bray.Dave@epa.gov>; McLerran, Dennis <mclerran.dennis@epa.gov>; Pirzadeh, Michelle <Pirzadeh.Michelle@epa.gov>
Subject: Fw: FYI

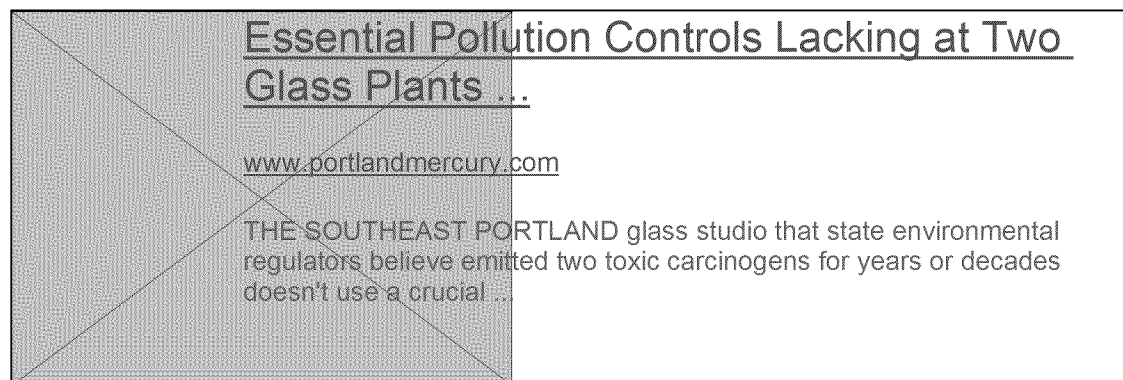
FYI, folks. See below. Alison in OAQPS is helping get responses to a list of questions from Oregon Public Broadcasting reporter, Cassandra Profita. See note below and excerpt from a Portland Mercury story re: the use of the "baghouses" at the two facilities.

From: Davis, Alison
Sent: Friday, February 12, 2016 7:34 AM
To: Holsman, Marianne
Subject: FYI

Cassandra also sent us this last night – just passing along. You have probably already seen it.

This was reported in one of our alt weekly papers, and it would be good to get some clarification. It doesn't look like they talked with anyone at the EPA, but they are attributing some information about the effectiveness of "baghouse" pollution controls to your agency:

<http://www.portlandmercury.com/BlogtownPDX/archives/2016/02/09/essential-pollution-controls-lacking-at-two-glass-plants-blamed-for-cadmium-emissions>



"THE SOUTHEAST PORTLAND glass studio that state environmental regulators believe emitted two toxic carcinogens for years or decades doesn't use a crucial pollution control device on its furnaces. And it's not the only glass factory in town to omit the safety equipment

The *Mercury* has learned that neither Bullseye Glass, 3722 SE 21st, nor its cross-town competitor Uroboros Glass Studio, 2139 N Kerby, have "baghouse" pollution control devices installed on their glass melt furnaces—even as they employ the devices in other parts of their operations. A DEQ official confirmed Bullseye didn't have a device on its glass furnace. Uroboros's owner confirmed the same about his company.

The lack of the controls—which the US Environmental Protection Agency says can catch nearly 100 percent of harmful particulates—makes it easy to see why regulators now suspect both outfits have been releasing vaporized cadmium into the air surrounding their factories."

Alison Davis

Senior Advisor for Public Affairs

US EPA, Office of Air Quality Planning & Standards

Research Triangle Park, NC 27711

Desk: 919-541-7587

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To: Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]
From: McClintock, Katie
Sent: Fri 2/12/2016 3:39:15 PM
Subject: FW: Request for MSDS Copies
[Arsenic.pdf](#)
[Cadmium.pdf](#)
[Chrome Oxide.pdf](#)
[Iron Chromate.pdf](#)
[Lead Frit.pdf](#)
[Selenium.pdf](#)
[Sodium Bichromate.pdf](#)

From: GRUNOW Greg [mailto:GRUNOW.Greg@deq.state.or.us]
Sent: Thursday, February 11, 2016 11:04 AM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: FW: Request for MSDS Copies

And it's me again!

As you requested, here are the MSDS sheets I got from Bullseye for some of their color additives. I had asked Bullseye for MSDS copies for their colorant additives that contain arsenic trioxide, cadmium, selenium, chromium, and/or lead. As chromates, the iron chromate and sodium bichromate products should both be Cr+6 materials, but, while labeled iron chromate, the MSDS that was supplied is actually for iron chromite, which would be a Cr+3 compound. I've asked Eric Durrin at Bullseye to clarify the product(s) being used.

Greg

Greg Grunow

Natural Resource Specialist

ODEQ Northwest Region

503-229-5690

grunow.greg@deq.state.or.us

From: Eric Durrin [<mailto:ericdurrin@bullseyeglass.com>]
Sent: Tuesday, February 09, 2016 11:59 AM
To: GRUNOW Greg
Subject: RE: Request for MSDS Copies

Hello Greg,

Here are the MSDS sheets for the colorants that you were asking about.

Regards,

Eric Durrin | Bullseye Glass Co. | 503-232-8887x103

To: McClintock, Katie[McClintock.Katie@epa.gov]; Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]
From: Owens, Katharine
Sent: Thur 2/11/2016 11:48:50 PM
Subject: Spectrum Glass Co.

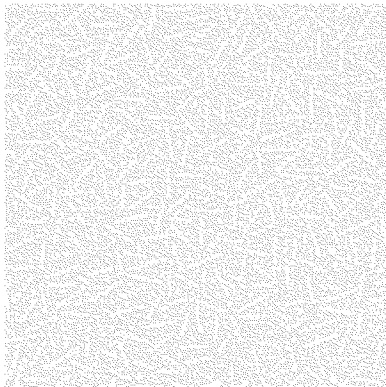
Madonna has kept me in the loop on Bullseye since Spectrum is larger, in Washington and a potential hot issue. If you foresee a scenario where the facility would need an applicability determination it would be helpful for me to see the facility. I hear you two are going up next week. If you think this is something necessary down the line and you're okay with one extra on your inspection next week, I would be happy to accompany you both. I still have my credentials ☺ (they don't expire until 8/31/2017).

Looks like it's only 40 mins away, if I'm looking at the correct facility:
<https://echo.epa.gov/detailed-facility-report?fid=110020498978>

-Katie

To: Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]
From: McClintock, Katie
Sent: Wed 2/10/2016 4:19:45 PM
Subject: Fw: paper on chromium emissions
[Mechanisms of chromium emissions from Wool Fiberglass Furnaces Final.pdf](#)

From: Fairchild, Susan
Sent: Monday, February 8, 2016 4:27 AM
To: armitage.sarah@deq.state.or.us
Cc: McClintock, Katie
Subject: paper on chromium emissions



Sarah, Katie asked that I send this paper to you also. It explains the mechanism of chromium emissions from glass furnaces. The focus is on wool fiberglass, but other glass furnaces would have similar mechanisms.

Because the mineral components of the glass 'recipe' can influence the rate of furnace wear due to glass chemistry and interaction with the refractory minerals, the chromium emission rate at Spectrum should be expected to differ from wool fiberglass furnaces (and even from other art glass furnaces, depending on the amount of cullet used and the differences in glass recipes).

The references are also really useful for further understanding of the different variables that may be involved.

Susan Fairchild

Senior Environmental Scientist

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Mail Code D 243-04

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MECHANISMS OF CHROMIUM EMISSIONS
FROM WOOL FIBERGLASS
GLASS-MELTING FURNACES

Susan Fairchild

June 2015

US Environmental Protection Agency
Office of Air Quality Planning and Standards
Sector Policies and Programs Division
Research Triangle Park, NC 27711

MECHANISMS OF CHROMIUM EMISSIONS FROM FURNACES IN THE WOOL FIBERGLASS INDUSTRY

WOOL FIBERGLASS MANUFACTURING

The Wool Fiberglass Manufacturing source category includes any facility engaged in producing wool fiberglass from sand, feldspar, sodium sulfate, anhydrous borax, boric acid or any other materials. In the wool fiberglass manufacturing process, molten glass is formed into fibers which may then be bonded with an organic resin to create a wool-like material that is used as thermal or acoustical insulation. The category includes, but is not limited to the following processes: glass-melting furnace, marble forming, refining, fiber forming, binder application, curing and cooling.

FURNACE TECHNOLOGIES

One wool fiberglass manufacturer provided the EPA with general schematics of the four different furnace types used to produce wool fiberglass. In general, these are electric furnaces (including both cold-top electric and electric steel shell) and gas-fired furnaces (including both oxyfuel and air-gas).¹

The industry is capable of producing a variety of products on any type of furnace, however, the current general industry trend is to manufacture residential insulation on rotary spin lines which are fed by gas-fired furnaces, and high density fiberglass products on flame attenuation lines which are fed by either electric or gas-fired furnaces. Higher density products typically have a lower production rate in order to achieve both a higher volume of fiberglass per cubic foot and greater amount of resin application to that fiberglass volume. Electric furnaces are generally more suited to that production rate, although the production line fed by a gas-fired furnace can be designed to also produce higher density products.

CHROMIUM REFRACTORIES

Chromium as chromite (Cr_2O_3) is added to refractories to provide superior resistance to both thermal and chemical attack.

“Refractory materials are chemical compounds that are used as structural materials forming insulation linings and/or as containment vessel in high temperature and corrosive environments in many industrial processes. The use of chromium in refractories is second in importance to its metallurgical applications. The mineral chromite is the only ore of chromium. About 15% of the total world chromite consumption is from the refractories industry.”²

¹ Mike Pettis, Owens Corning, Inc. in response and follow-up to site visits conducted at wool fiberglass manufacturing facilities, December 2012.

² According to the EVISA website, “The European Virtual Institute for Speciation Analysis is a service provider in the fields of speciation analysis. EVISA's web portal is the primary source for all those seeking information about chemical species with respect to analysis, biological activity (toxicity, nutritional value, metabolism), legislation (laws, rules, standards) and research in related fields.”

ANH Refractories writes in their website³, “Wool and C-Glass⁴ makers rely on NARCO's extensive line of chrome-alumina materials, the SERV and JADE brands, available in standard pressed brick, large cast shapes, and Cast-in-Place linings.”

In 2012, the EPA requested under authority of section 114 of the Clean Air Act (CAA), chromium (total and hexavalent) emissions testing and furnace construction data of all operating glass-melting furnaces located at wool fiberglass facilities in the U.S. This CAA section 114 Information Collection Request (ICR) included questions to obtain information about the chromium content of all refractories based on location in the furnace, furnace age, last rebuild and repair date, and anticipated furnace life. While the facility-specific data are confidential business information (CBI), the data characterizing the use of chromium refractories in furnace construction were averaged at each furnace location according to percent chromium in the refractory. These data are presented in Table 1 below.

According to the North American Insulation Manufacturers Association (NAIMA), “Fiber glass companies have chrome emissions because insulation glass manufacturers use refractory products that contain chrome to make up the glass furnace (see Attachment 8, spreadsheet showing typical chrome content). These can either be in glass contact (pavers (floor) or sidewalls) or above glass (superstructure (frontwall, backwall, and breastwalls)), along with port and stack. Insulation manufacturers use these ... refractories because of the unique composition of C- Glass. C-Glass contains boric oxide (B_2O_3). This oxide is essential to give the fiber necessary characteristics for its specific use. Unfortunately, boron compounds are not compatible with refractory containing alumina (Al_2O_3). Alumina is a key component in just about every other major form of high temperature refractory. Since the advent of chrome based refractory, insulation manufacturers have been able to extend furnace life up to 50 percent. Without these refractories, wool fiber glass manufacturers would not likely be competitive in the global marketplace.”

FUNCTION AND PURPOSE OF CHROMIUM REFRACTORY IN THE WOOL FIBERGLASS INDUSTRY

Chromite, derived from ore, is used in the material formulation for the manufacture of chromium refractories for its ability to withstand the interior fiberglass furnace environment.⁵ The European Virtual Institute for Speciation Analysis (EVISA) evaluated chromium refractories in use across industry sectors, and summarizes that “Chrome-based refractories are typically used in cement kilns, secondary steel refining furnaces, foundry sands, glass melting furnaces, and incinerators. In some cases alternative materials -- such as magnesium-aluminium spinels, spinel-bonded magnesite and high alumina refractories -- have replaced chrome-containing refractories. However, these materials do not always meet performance or cost requirements.”

³ <http://www.anhrefractories.com/ANH-refractories-about>. ANH Refractories was formed by a merger of A.P. Green, NARCO, and Harbison-Walker in 2001.

⁴ Per NAIMA, C- Glass is the generic glass chemistry designation for fiberglass insulation

⁵ “Chromium in Refractories”. Sept. 2000. Dr. Mariano Valez, Ceramic Engineering Dept., Univ. Missouri-Rolla.

Table 1. Percent of Chromium in Refractory by Furnace Location

Furnace Location	Oxyfuel Furnace (% chromium)	Air Gas Furnace (% chromium)	Notes
Glass Contact Side Wall	30-60%	28-95%	The glass/metal line is along this wall.
Glass Contact – Floor Paving	30-80%	28-60%	Beneath the level of the molten glass.
Breast Wall	30-60%	0%	Raw material furnace feed is typically in this area.
Crown	30-50%	0-85% ^a	The interior arching ‘roof’ of the furnace above the glass melt.
Back Wall	30-80%	28-95%	The area at and above the outlet of the furnace where molten glass is extruded. Temperatures and corrosion are typically higher in this area.
Portneck / Stack	50-92%	0-95%	Leading to the throat of the furnace.
Throat	50-92%	50-95%	The furnace exit.

^a Companies did not report chromium in the refractories of the crown of air-gas furnaces. However, during site visits conducted by the EPA in December 2012, one facility operating an air-gas furnace explained that the reduction in chromium emissions was due to a ‘hot repair’ conducted on the crown, during which the repair was made using a non-chromium refractory patching material. This company stated that the crown was constructed of high-chromium refractories.

EVISA, a service provider in the field of speciation analysis, summarizes on their website⁶ that “the usefulness of chromite as a refractory is based on its high melting point of 2,180 °C (3,960 °F), moderate thermal expansion, neutral chemical behavior, and relatively high corrosion resistance. Chromite enhances thermal shock and slag resistance, volume stability and mechanical strength. In contact with iron oxide, it forms a solid solution (a homogeneous crystalline phase composed of different minerals dissolved in one another) with iron oxide and expands considerably, causing the refractory to crumble (bursting). Adding magnesia can prevent this phenomenon.”

“Substitutes for chromium-containing products are available, but they sometimes have a shorter life span. Also, a substitute that works in one application may not work in another application, or the life span is significantly reduced.”⁷

⁶ <http://www.speciation.net/>

⁷ From Babcock and Wilcox Plant Service Bulletin. “Refractories, Plastics, Insulation or Textiles Containing Chromium Compounds”. Babcock and Wilcox is a Field Testing Service which specializes in technical advice in industrial construction.

FURNACE DESIGN

Table 2 presents a summary of the chromium test data for wool fiberglass glass-melting furnaces. The data show a significant range of chromium emissions. Available data indicate that all furnace types use high chromium refractory in some areas (see Table 1). Because chromium refractories are used at and below the level of the glass in all wool fiberglass glass-melting furnaces (as shown in Figures 1-4), all of the glass-melting furnace types have some sources that emit at very low levels. However, only gas-fired glass-melting furnaces show a potential to emit chromium at higher levels, and to form hexavalent chromium in the furnace environment due to both temperature and chemistry. The glass-melting furnace design (layout and location of chromium refractory), energy source, glass chemistry and rate of refractory corrosion are the major factors affecting chromium emissions from glass-melting furnaces.

Table 2. Range of Chromium Compound Emissions by Glass-Melting Furnace Type

Glass-Melting Furnace Type	Chromium Compound Emissions (lb/1,000 tons glass pulled)
Electric Steel Shell	0.0022 – 00.039
Cold-Top Electric	0.00078 – 0.027
Air-Gas	0.0025 – 0.96
Oxyfuel	0.011 – 3.5

ELECTRIC FURNACES

The average emissions of all metal HAP are very low for electric glass-melting furnaces. This low emission potential is inherent in the glass-melting furnace design. Electric glass-melting furnaces establish a crust on the raw material at the surface of the molten glass during the startup process. During normal operation, the electric furnaces use electrodes which are embedded below the crust and within the molten glass to maintain the temperature of the melt, while the temperature above the melt is low. Electric furnaces also have lower air flows and low turbulence above the glass melt. Therefore, the potential for metal emissions (as part of the total PM entrained in the exhaust gas) from electric glass-melting furnaces is much lower than from gas-fired glass-melting furnaces.

Electric furnaces also do not have the same potential to emit chromium as gas-fired furnaces. The maximum measured chromium emissions at an electric furnace is approximately equivalent to the minimum chromium emissions at an oxyfuel furnace. Although electric glass-melting furnaces are lined at and below the glass/metal line with chromium refractories, they are constructed using either non-chromium refractories (cold-top electric) or steel in place of refractories (electric steel shell) above the glass/metal line. This design is used because electric glass-melting furnaces operate with a dry batch cover and are tapped at the bottom or end of the glass-melting furnace to draw off the molten glass. Raw materials are constantly added to the top of the glass-melting furnace in damp form, which maintains the crust on the surface of the molten glass.

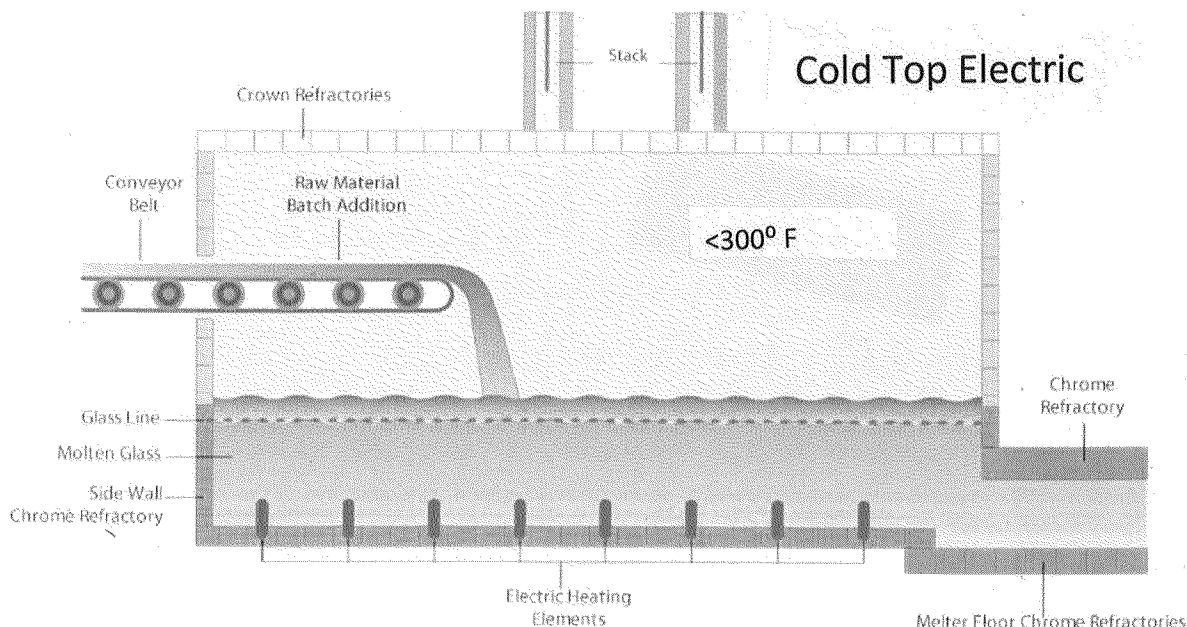


Figure 1. The Cold-Top Electric Furnace

Steel shell glass-melting furnaces have a steel enclosure above the glass/metal line and cold-top electric glass-melting furnaces use non-chromium refractories above the glass/metal line. The air above the melt inside an electric glass-melting furnace is below 300°F, and is not hot enough to warrant use of chromium refractories. Even if chromium refractories were used to construct the crown of the electric glass-melting furnace, the temperature of an electric glass-melting furnace above the glass/metal line is insufficient to drive the chromium to its hexavalent state.

Information provided by the industry on furnace design indicates that gas-fired glass-melting furnaces have a higher potential to emit chromium compounds than electric furnaces due to the placement of the high chromium refractory, the physical layout of the furnace, the size and placement of the burners in relation to the sides and top of the glass-melting furnace, the peak flame temperature, the depth from the burners to the top of the raw materials, the temperature at and above the melt, and the oxide concentration of the glass-melting furnace gas environment. In addition, the oxyfuel furnace (the predominant type of gas-fired furnace) shows the greatest potential to convert chromium to its most toxic form, hexavalent chromium, due to the significantly higher temperature above the glass melt line of a gas-fired furnace.

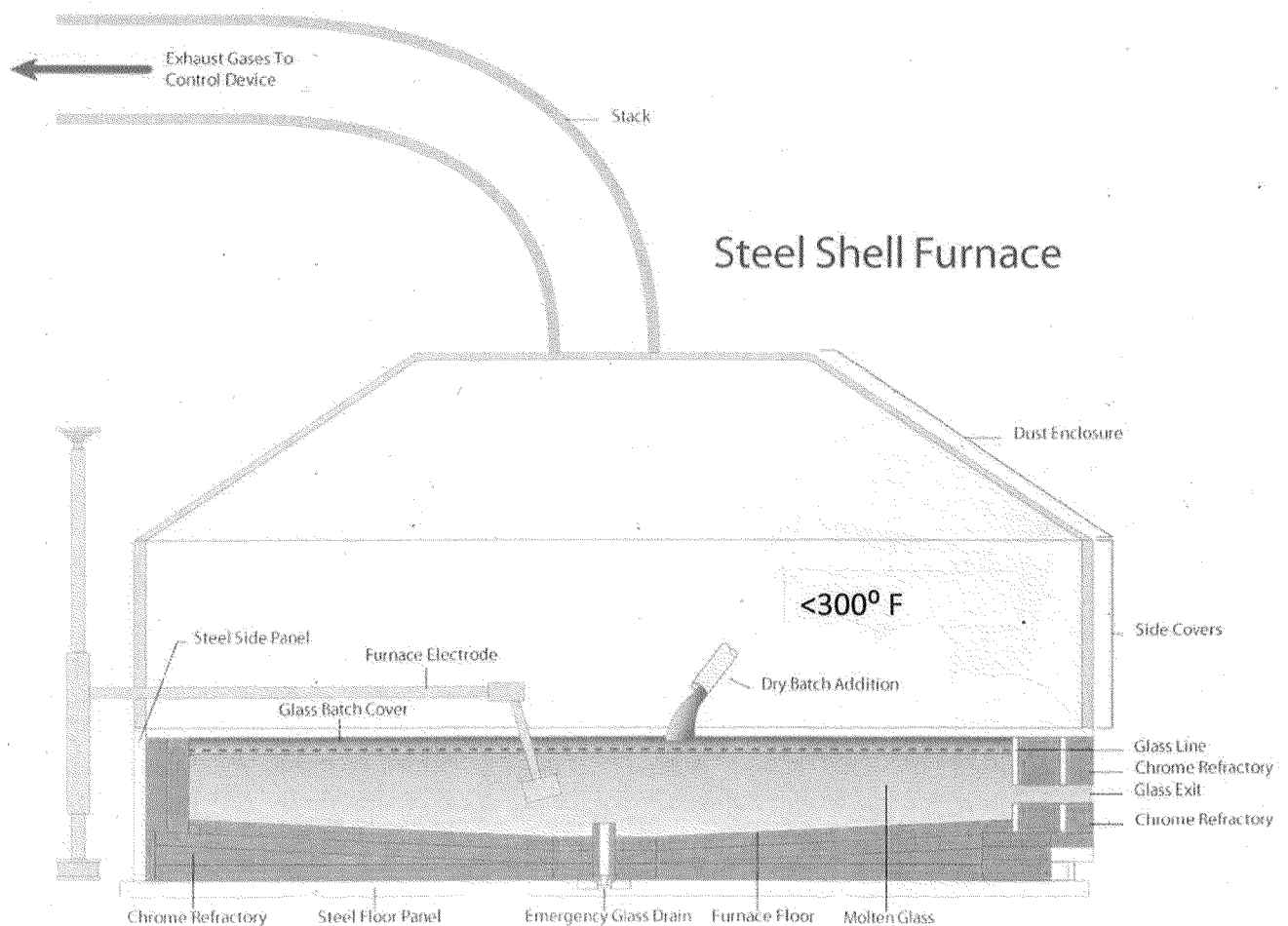


Figure 2. The Electric Steel Shell Furnace

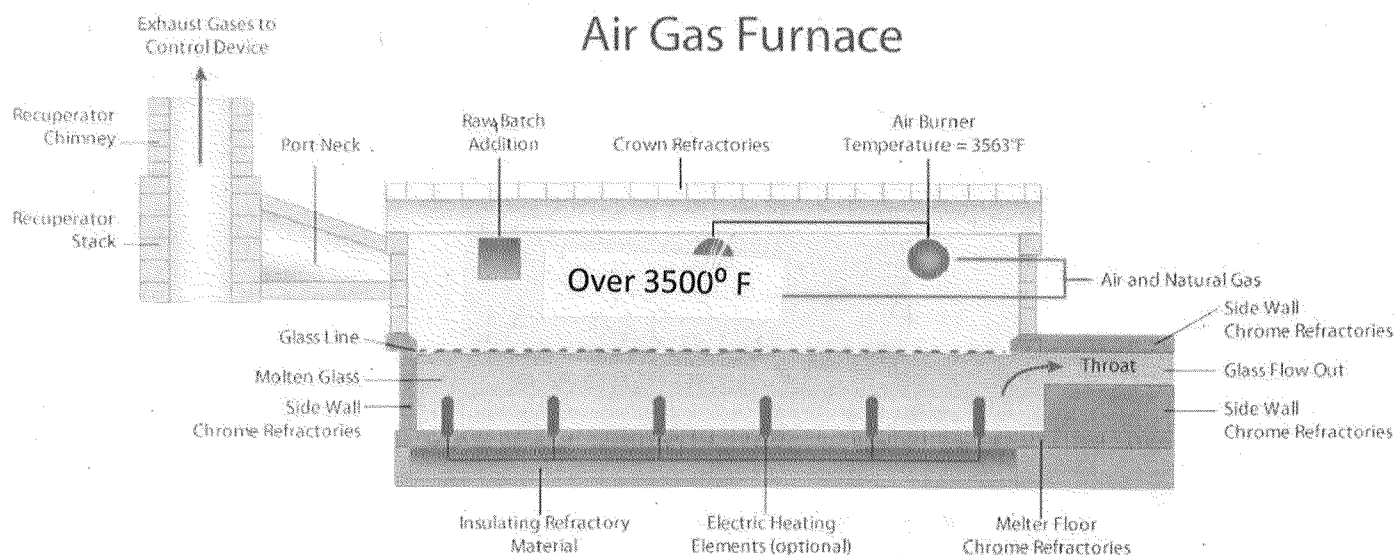
THE AIR-GAS FURNACE

The data submitted by the wool fiberglass manufacturing industry on glass-melting furnace type and construction materials (in response to both NAIMA's voluntary survey and under the EPA's section 114 ICR) indicate that the highest emitting glass-melting furnace is an oxyfuel glass-melting furnace constructed using chromium refractories. However, all glass-melting furnaces with the high chromium emissions were either oxyfuel or air-gas glass-melting furnaces.

Air-gas furnaces have a higher potential to emit PM than oxyfuel furnaces because air-gas furnaces require that combustion air or oxygen and natural gas be blown into the furnace. This increases the gas flow velocities and turbulence above the glass melt line, which increases the potential for particle entrainment in the exhaust gas.

As early as the 1970's, furnace designers across the glass sector (which includes container, fibers, flat and specialty glasses) were replacing air-gas furnaces with oxyfuel technology, and

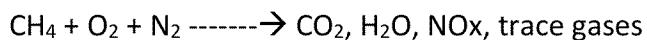
expected the oxyfuel furnace to overtake the industry for the future manufacturing process⁸. By 2003, 29 percent of the air-gas furnaces at wool fiberglass insulation facilities had been replaced by oxyfuel furnace technology, and elements of furnace design, such as burner placement and crown height above the glass melt (or 'slag') were known to affect both firing rate and glass pull rates. A higher crown height results in a lower average crown refractory temperature, Figure 3. The Air-Gas Furnace



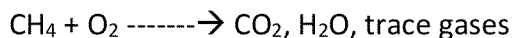
and reduces the alkali corrosion of the crown. However, as recently as 2003, the oxyfuel furnace designs still used the silica crown refractory which was known to present problems in operation at the oxyfuel furnaces, including severe corrosion at the hinges of crown bricks.⁹

ADVANTAGES OF THE OXYFUEL FURNACE

The oxyfuel furnace has numerous advantages over the air-gas furnace for the glass industry. In both furnace types, the fuel is natural gas (CH₄). Air contains 78.9% nitrogen, which acts as a ballast and reacts with oxides in the glass furnace. The combustion process in the air- gas furnace is:



The combustion process of the oxyfuel furnace is:



Because only oxygen and the fuel natural gas are needed in the combustion reaction, nitrogen, which comprises almost 80% of air, is not introduced to the furnace. Several benefits are

⁸ Oxyfuel Fired Glass Melting Technology – Experience, Evolution and Expectation. H. Kobayashi and A. Tasca, Praxair. Presented at the Annual Meeting of International Commission on Glass (ICG) Campos do Jord, SP Brazil. Sept 21-25, 2003.

⁹ Severe corrosion leading to breakthrough, typically at joints and hinges of the refractory surfaces is called a 'rat hole,' or 'rat-holing.'

realized as a result of eliminating N₂ including: increased productivity, greater energy efficiency, enhanced flame stability, reduced exhaust gas volume, and reduced NO_x and PM emissions.

The actual flame temperature is determined by the flame radiation efficiency and the combustion system. The best radiation efficiency occurs when both heat absorption of the load and heat refraction of the furnace walls are maximized. The combustion system is optimized when no products of incomplete combustion remain (i.e., CO and H₂ from partial combustion of CH₄, and unreacted O₂ which may occur as a result of chemical dissociation, a common problem at high temperatures.)

The required fuel input is greatly reduced in the oxyfuel furnace in comparison to the air-gas furnace. The exhaust volume per unit of fuel input is reduced as a function of the elimination of nitrogen, and the available heat increases as a result of the same driver.

Productivity is increased both because of optimized heat transfer (via flame to the load) as well as the raw material substitution of cullet for all or most of the raw minerals needed to produce wool fiberglass. Because cullet is glass that has already been melted at least once, the atomic bonds of the elements of the mineral assemblages do not exist in the glass; they have already been severed in the first melting. Also in the first melting, gases such as oxygen in SiO₄ (silica) and SiO₂ (silicate minerals) has already been liberated, and the resulting glasses are free of those atomic bonds. They therefore melt readily and at a much lower temperature than raw minerals, the eutectic point is reached quickly, and hence the production rate is greatly increased.

Oxyfuel furnaces have much lower energy demands compared to air-gas furnaces because a portion of the heat input provided by the natural gas is not wasted in heating non-oxygen components (e.g., nitrogen) present in ambient air. In oxyfuel glass furnaces, peak flame temperatures approach 5,000 °F, whereas air-gas flame temperatures peak at about 3,560 °F.

The volume of exhaust gases is reduced significantly in the oxyfuel furnace as nitrogen is eliminated from the combustion process in the furnace. The oxyfuel furnace design achieves a large reduction in nitrogen oxides (NO_x), which results from the fact that ambient air (which contains nitrogen and other compounds) is not introduced into the high-temperature zone above the glass melt. Instead, the oxyfuel glass-melting furnace design mixes the natural gas fuel with industrial-grade oxygen for combustion, thus reducing NO_x emissions. The reduction in the use of outside air in the furnace greatly reduces the overall volume of furnace gases exiting the furnace stack, and hence PM emissions are greatly reduced as well.

Nitrogen also acts as a ballast in the air-gas furnace. Because it is eliminated in the oxyfuel furnace, combustion in the oxyfuel furnace is nearly complete and immediate. Management of the oxygen : natural gas mixture to raw material throughput must be closely monitored to optimize the production rate.

FURNACE MATERIALS AND DESIGN

Initially, air-gas furnaces were replaced with oxygen technology by simply adjusting the size of the ports used to inject air into the furnace, narrowing their diameter to account for the

reduction in volumetric flow associated with using oxygen rather than ambient air. The balance of oxygen and natural gas in the furnace was typically also adjusted, and the aim of the oxygen flame, which is much hotter than the air-gas flame, was sometimes adjusted when possible. However, the location of the oxygen port in relation to the natural gas ports is not easily changed until the furnace rebuild. Other furnace features that require changes to the furnace design and/or gas flow through the furnace can only be added at rebuild.

The oxygen and natural gas jets in the oxyfuel furnace should be designed, aimed, and positioned to optimize the combustion process specific to each oxyfuel furnace design. Refractory corrosion is exacerbated when the flame direction is too high (i.e., aimed at the crown), the crown is too low for the furnace design, or when the flame is too robust (and impacts the opposite side of the furnace).

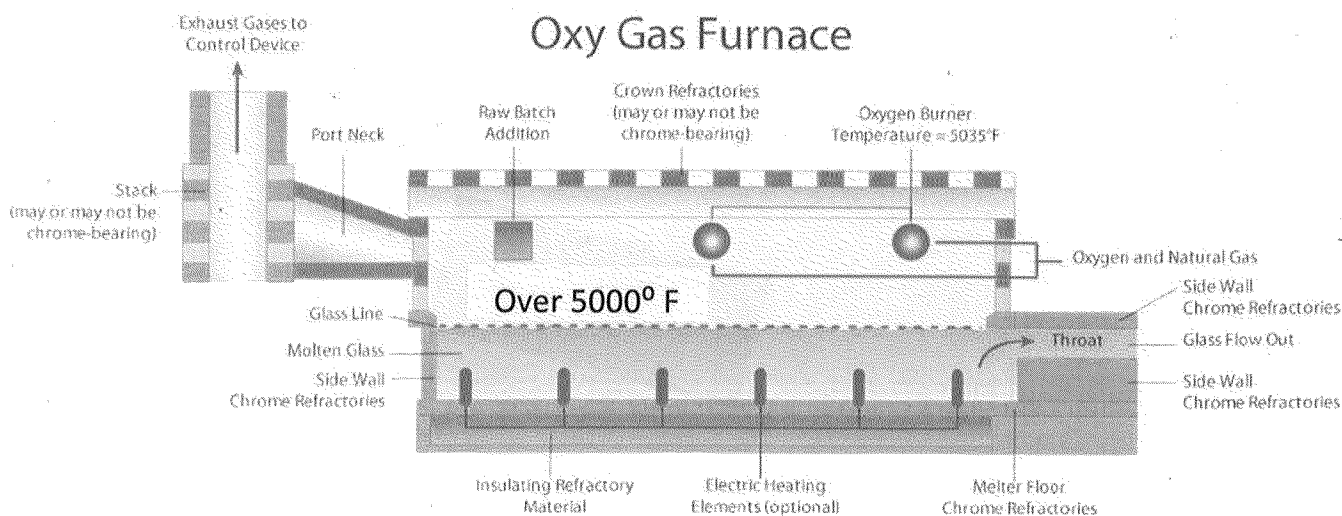


Figure 4. The Oxyfuel Furnace

The Department of Energy's (DOE's) Office of Industrial Technology, in association with persons in the glass manufacturing, refractory production sectors and the Oak Ridge National Laboratory, conducted studies to determine ways to optimize energy uses, needs and efficiencies in industrial sectors. In these studies, it was agreed that oxyfuel glass-melting furnaces will ultimately replace air-gas glass-melting furnaces by 2020 due to economic and environmental factors. Participants in the Industrial Technologies Program (ITP), under the DOE's Energy Efficiency and Renewable Energy program, described the demands an oxyfuel glass-melting furnace places upon the refractory lining: "The ITP has recognized that a reduction in overall domestic energy consumption will occur if the primary energy-consuming industries improve their own energy efficiencies. Recognizing this need, the glass industry is currently converting older, conventional air-fuel-fired furnaces to oxyfuel firing, or in the case of new construction, is building new oxyfuel-fired furnaces instead. This has caused oxyfuel technology to become one of the fastest growing technologies in the glass industry because it promises pollution abatement, increased glass-pull effectiveness, capital cost savings and increased energy efficiency. For example, a recent study has shown that approximately \$202M

in energy savings per year in 2005 and a \$445M per year savings by 2020 could be expected with the conversion of air/fuel to oxyfuel-fired glass manufacturing furnaces. These results, which reflect energy savings of 2.8 and 14.2 TBtu/year, respectively, are based on the projection that 61 percent and 100 percent furnace conversions will occur by the years 2005 and 2020, respectively.”

According to technical sources,^{10, 11} once a source of reasonably priced oxygen becomes available, the oxyfuel glass-melting furnace is the design favored for use by glass manufacturers due to the advantages of oxyfuel furnaces over other glass-melting furnaces discussed above (i.e., low NOx emissions, low energy demands per volume output of glass, and high production rate, especially with the increased use of cullet in the raw material mixture).

CHROMIUM EMISSIONS AND THE GAS-FIRED FURNACE

“Unlike other fiber glass furnace classes, virtually all of the above-glass refractory in a gas-oxy furnace¹² is also chrome bearing. Currently, there is no material available that is as good as chrome based refractory to resist the chemical corrosion and have the structural integrity at the higher temperature necessary to operate a gas-oxy furnace... Fiber glass furnaces necessarily use chrome-based refractory products. Virtually all of the above-glass refractory in gas-oxy furnaces, unlike other furnace classes, is chrome-based refractory.”¹³

Although all glass-melting furnaces are constructed using chromium refractories^{14, 15} at and below the line of contact defined by the refractory wall and the molten glass within the glass-melting furnace (the glass/metal line), oxyfuel and some air-gas glass-melting furnaces have other glass-melting furnace parts constructed using chromium refractories, such as the crown and forehearth. The use of chromium refractories above the melt line is necessary to obtain the desired furnace life and reduce the necessity for hot repairs of the furnace. When the hot, corrosive and reactive gases of a gas-fired glass-melting furnace come in contact with the high-chromium refractories lining the area at and above the glass melt in high-temperature glass-melting furnaces, the chromium is available to be oxidized and converted into its hexavalent form.

In the stated opinion of the trade association (NAIMA, February 2012), oxyfuel furnaces have greater chromium emissions than other furnaces because “the combination of furnace design,

¹⁰ “Oxygen Production” McGuinness, Rober M. and Kleinberg, William T. 1998. Oxygen-Enhanced Combustion. Charles E. Baukal, Jr. ed.

¹¹ US Department of Energy, Efficiency and Renewable Energy, Industrial Technologies Program, Final Technical Report, “Compressive Creep and Thermophysical Performance of Refractory Materials”. Oak Ridge National Laboratory, June 2006, p. 9.

¹² The term gas-oxy, gas-oxyfuel, and oxyfuel are used interchangeably by the trade association. We are using the term “oxyfuel” here because it is the predominant term in the technical literature, and denotes a gas-fired furnace that uses oxygen in place of air in the natural gas-fired furnace.

¹³ Comments of the North American Insulation Manufacturers Association on Behalf of the Wool Fiber Glass Manufacturers EPA’s Proposed Rule National Emissions Standards for Hazardous Air Pollutants: Mineral Wool Production and Wool Fiberglass Manufacturing. Angus Crane and Granta Nakayama. February 3, 2012.

¹⁴ Letter from NAIMA to U.S. EPA, January 28, 2013.

¹⁵ Wool Fiberglass Manufacturing Industry Meeting Notes, August 31, 2011

glass composition, higher flame temperatures, higher water vapor concentration, and an oxidizing atmosphere with increased concentration of oxides (filterable and condensable PM) can cause more rapid deterioration of the refractory in a gas-oxy fiber glass insulation manufacturing furnace than in other types of glass furnaces. The concentration of glass batch ingredient volatiles and water vapor in the oxyfuel furnace environment increases with the reduction in the flue gas volume (as compared to air gas furnaces, which dominated the industry prior to 1990). The peak flame temperatures are up to 40 percent higher than in air gas furnaces which increases the rate of melting, lowers the eutectic point, and drives the reaction of chromium from the trivalent (Cr_2O_3) state to the hexavalent (Cr_2O_6) state.”

NAIMA, in their February 2012 letter, added that “the higher temperature of the gas-oxy burners can volatilize the glass batch components more readily than in other furnaces. These glass volatiles that contain alkaline earth oxides reduce the temperature that chrome can be vaporized to as low as 1,832 degrees Fahrenheit. While the chrome must still reach temperatures of 2,700 degrees Fahrenheit to 2,900 degrees Fahrenheit to oxidize the trivalent chromium oxide (i.e., Cr_2O_3 to Cr_2O_6), the potentially increased volatiles can contribute to higher chrome emissions. The 40 percent higher peak flame temperature of oxyfuel burners also raises the probability that available chrome will encounter the conditions that will convert it to the hexavalent form (i.e., Cr_2O_6). Combined, these differences generate conditions which are more corrosive to chrome refractory and can create favorable conditions for conversion to hexavalent chromium (Cr_2O_6) inside a gas-oxyfueled furnace.” According to NAIMA, “These severe conditions do not exist in the other fiber glass furnace classes.” Note the flame temperature of the air-gas furnace is sufficient to convert chromium to the hexavalent state, and that the chromium emissions from air-gas furnaces is dependent upon the refractory materials used to construct the furnace at and above the glass melt line.¹⁶

¹⁶The flame temperature of the oxyfuel furnace is 5,000° F; the flame temperature of the air-gas furnace is 3,200-3,500° F.

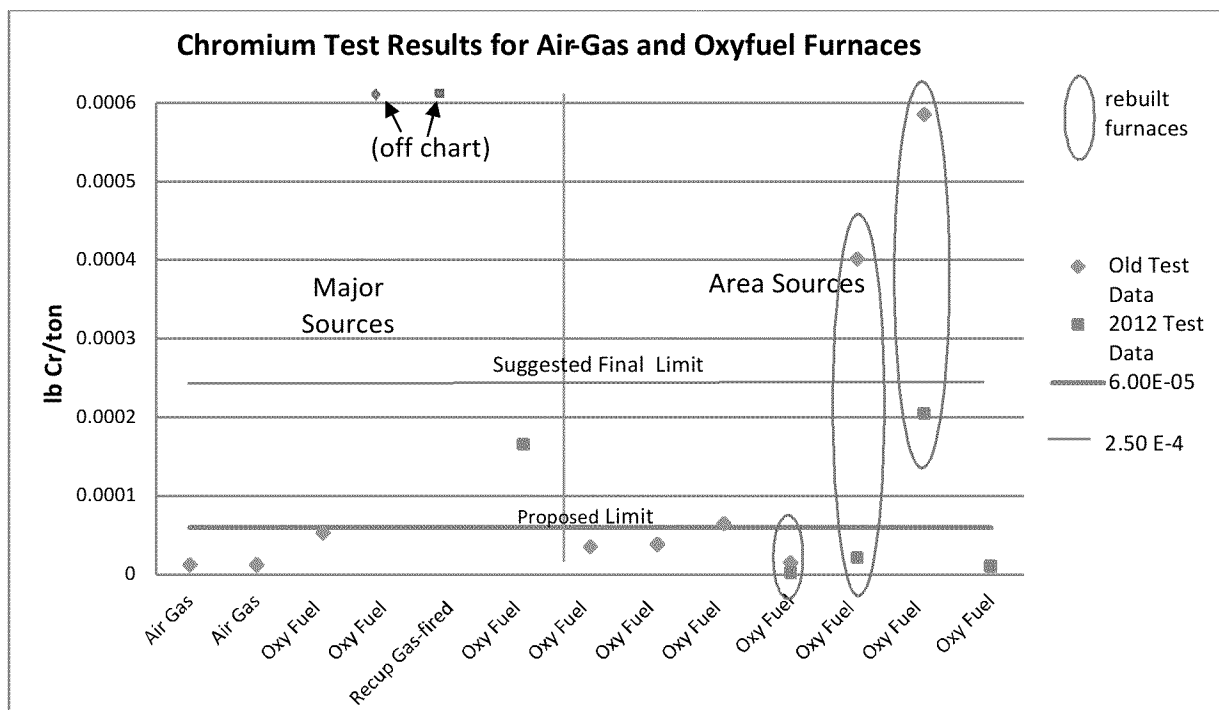


Figure 5. Chromium Test Results for Air-Gas and Oxyfuel Furnaces

CHEMISTRY OF GLASS AND ITS RELATION TO CHROMIUM EMISSIONS

As discussed by Brosnan, 2012¹⁷, the wool fiberglass ‘recipe’ uses alkali or alkaline earth oxides, or boron oxide (borax) for its properties to terminate chains and sheets of silicon and oxygen tetrahedral in glass melt. The result of this ability to terminate is the formation of macromolecules. These macromolecules, kinetically unable to crystallize at low temperature, essentially polymerize the glass.

Other studies¹⁸ advise us that, under normal industrial temperatures (which can exceed 1,300 °F) and oxidizing conditions, trivalent chromium, which is present in the refractory, oxidizes to hexavalent chromium.¹⁹ The studies found that uncombined and available oxides were responsible for a higher yield of hexavalent chromium. Consequently, an increasing concentration of oxides in the oxyfuel glass-melting furnace environment increases the formation of chromium from the trivalent state to hexavalent state. The condition of high oxides in the oxyfuel glass-melting furnace environment is one characteristic of the highest emitting glass-melting furnace.²⁰

¹⁷ Technology Review. Chromium Emissions from Wool Fiberglass Melting Furnaces. Brosnan, Denis A. Ph.D., PE. Clemson University, Clemson, SC February 1, 2012.

¹⁸ Metallurgical and Materials Transactions, Lee, Y., Nassaralla, C.L., 1998.

¹⁹ Metallurgical and Materials Transactions B. “Minimization of Hexavalent Chromium in Magnesite-Chrome Refractory”. Y. Lee and C. L. Nassaralla. Vol. 28 B, Oct. 1997-pp. 855-859.

²⁰ US EPA docket number EPA-HQ-OAR-2010-1042; document number 0067: Region 7 Notes on CertainTeed Kansas City. June 10, 2011. 13 pages.

According to Praxair, the formation of alkali vapors depends on furnace temperature, water vapor concentration and the flame characteristics. Additionally, Praxair compared the new oxyfuel furnace technology to the air-gas furnaces it replaced, and found that, “although the total amount of alkali volatilization, which is approximately proportional to the total particulate emissions, in an oxyfuel furnace, is less than that from the corresponding air fired furnace, the average concentration of the alkali species is increased by as much as three fold due to the elimination of nitrogen from the combustion air.”

Brosnan further explains that chromium enters the glass in wool fiberglass furnaces below the glass line, and goes into solution without having the potential for volatilization at glass melting temperatures²¹. Chromium enters the silicate network structure of the glass as a ‘modifier’ of the network, and cannot form glass on its own due to thermodynamic constraints. According to Brosnan, chromium is held ‘rigidly’ in the silicate structure in interstices in the atomic network, and is present in coordinated complexes with oxygen²².

Boron, a raw mineral additive required for the manufacture of wool fiberglass, is a highly reactive component of the wool fiberglass formula and interacts chemically with oxides in the furnace environment. Chromium refractory products have been developed for use with highly reactive and corrosive glasses.²³

CHROMIUM EMISSIONS AS A FUNCTION OF REFRACTORY CORROSION

Both chemistry and temperature function as drivers in refractory corrosion. Brosnan⁶ defined refractory corrosion as “refractory wear by loss of thickness and mass from the exposed face of the refractory as a consequence of chemical attack by a corroding fluid in a process in which the refractory and the corroding fluid react approaching chemical equilibrium in the zone of contact between the refractory and the fluid.”²⁴ (emphasis added).

Brosnan describes refractory corrosion as the contact between the reactive component, or ‘slag,’ and the exposed surface of the refractory, or ‘hot face,’ at elevated temperature. Brosnan points to this interface as the driving mechanism for corrosion which continues throughout the life of the lining. Later in this work, Brosnan adds that “the hot face temperature primarily affects the rate of corrosion reactions....when the hot fact temperature is more than 20°C above the eutectic²⁵, corrosion is rapid.” However, Brosnan adds that

²¹ Chromium volatilization is only reported in the non-equilibrium melting of glasses at plasma processing temperatures, i.e., with flame temperatures typically reported as above 7,000°C (>12,000°F). Brosnan, 2012.

²² C. Nelson, Transition Metal Ions in Glasses: Network Modifiers or Quasi-Molecular Complexes, Mat. Res. Bull. 18 (1983) 959-966.

²³ New High Chrome Fused Cast Refractory for Use in Contact with Highly Corrosive Glasses. T. A. Myles and F. Knee. American Ceramic Society Inc., Refractories Div., Sohio Engineered Materials Co., 1986.

²⁴ “Corrosion of Refractories”, Brosnan, Denis A., Ph.D., P.E., Clemson University, Clemson, SC. in the Refractories Handbook, ed.2004. Charles A. Schacht. Marcel Dekker, Inc. NY, NY.

²⁵ The term **eutectic system** is used to describe a homogeneous solid mix of atomic and/or chemical species, to form a joint super-lattice, by striking a unique atomic percentage ratio between the components — as each pure component has its own distinct bulk lattice arrangement. It is only in this atomic/molecular ratio that *the eutectic system melts as a whole*, at a specific temperature (the eutectic temperature) *the super-lattice releasing at once all*

maintaining a hot face temperature of not more than 20°C above the solidus temperature between the slag and the refractory is impractical in many thick-wall refractory designs.

Corrosion of the refractory wall is further driven by slag penetration, which may result in both densification spalling and thermal shock spalling. Spalling (i.e., flaking or fragmenting) of the refractory wall increases the rate of refractory degradation.

Moreover, while the degradation of the glass-melting furnace refractory indicates increasing chromium emissions, that process does not necessarily follow a normal and predictable pattern. The degradation of refractories within the glass-melting furnace is a function of numerous factors, including temperature, time, stress and the composite effects of aging and creep response. These processes are highly nonlinear, so the traditional equations that assume steady-state deformation rates are not appropriate (DOE, 2006).

The facility with the highest emitting glass-melting furnace (an oxyfuel glass-melting furnace) submitted chromium testing over a single furnace campaign on four separate occasions over a 7-year period for state inventory reporting purposes. As shown in Table 4 below, those test results are extrapolated using permitted production rates to estimate annual emissions of chromium compounds. The estimated chromium emissions for 2004 are less than 5 pounds annually. Repeated chromium emissions testing for the state reports in 2005 and 2008 and permitted production rates for those years show chromium emissions increased to 540 pounds per year for the same glass-melting furnace. Emissions testing conducted in 2010 which speciated chromium by its compounds show that 93 percent of the chromium emitted was in the hexavalent state. This glass-melting furnace was not reconstructed during this 7-year period covered by the chromium testing.

Table 3. Summary of Chromium Emissions from 2004 – 2010 over a single furnace campaign.

Year	Glass-Melting Furnace Chromium Emissions at Permitted Production Rate, Pounds per Year
2004	<5
2005	30
2008	114
2010	540

its components into a liquid mixture. The eutectic temperature is the lowest possible melting temperature over all of the mixing ratios for the involved component species. Upon heating any other mixture ratio, and reaching the eutectic temperature, one component's lattice will melt first, while the temperature of the mixture has to further increase for (all) the other component lattice(s) to melt. Conversely, as a non-eutectic mixture cools down, each mixture's component will solidify (form its lattice) at a distinct temperature, until all material is solid. (Wikipedia, 2015).

We have also found that as the refractories of the gas-fired glass-melting furnaces degrade, the chromium of those refractories at and above the metal/glass line is emitted as particulate to the outside air. Chromium from the refractories below the metal/glass line is absorbed into the molten glass and becomes vitrified with the other raw minerals. Industry commented that refractory loss from degradation of the refractory walls in use is approximately 20,000 pounds of refractory annually²⁶. However, much of the loss occurs below the glass melt line. The chromium released below the glass melt line is believed to mostly stay in the glass, although testing that would demonstrate this has not been found to date.

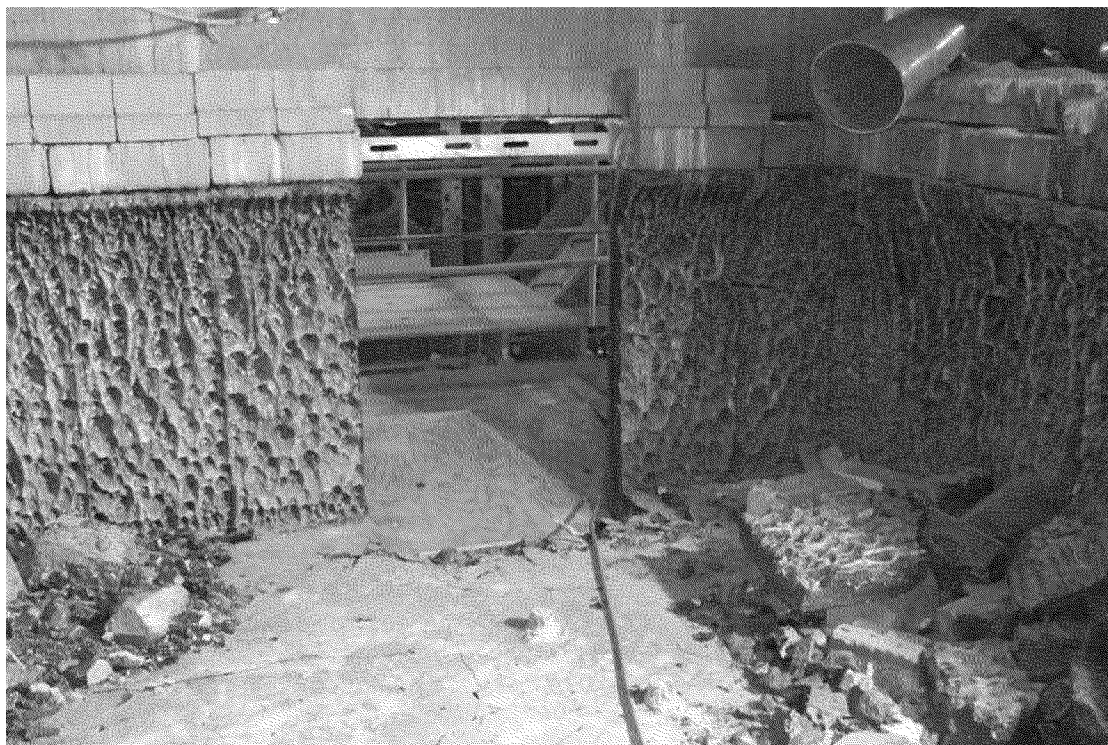


Figure 5. Chromium refractory wear pattern with furnace age, shown at rebuild. (Photo courtesy of Owens-Corning).

Table 3 shows that degradation of the chromium refractory resulted in a significant and exponential increase in chromium emissions during this period. One glass furnace manufacturer (Praxair, 2003) also corroborates that the rate of corrosion typically increases exponentially with temperature, but notes exceptions to this principle. Owens-Corning provided photos of the interior furnace refractory wall of a furnace that has been shut down for rebuild are shown in Figures 5-7. Note the curved quasi-hemispherical cavities typical of the wool fiberglass oxyfuel furnace interior. This pattern of refractory wear further supports the emissions profile as an exponential increase in chromium with furnace age.

²⁶ Minutes of the August 31, 2011 Meeting between US EPA and Representatives of the Wool Fiberglass Industry and NAIMA

The industry has a strong economic incentive to develop and use longer lasting refractories in construction of the glass-melting furnaces. Industry spokespersons have indicated that they rely on using chromium refractories offering longer glass-melting furnace life²⁷. The cost of rebuilding a wool fiberglass glass-melting furnace ranges from \$10-12 million; most of this cost is the cost of skilled labor (CertainTeed, 2011). While chromium refractories are more expensive than conventional refractories, they are only incrementally so (DOE, 2006). When conventional (high alumina/silica) refractories are used, the useful life of the glass-melting furnace is about 7 years. Use of chromium refractories to construct a wool fiberglass manufacturing oxyfuel furnace almost doubles its useful life when compared to other types of refractories.



Figure 6. Furnace wear of chromium refractories in a furnace under rebuild. The 'jade green' color is indicative of chromium refractory bricks. These chromium refractories are below, at, and above the glass line. (Photo courtesy of Owens-Corning).

New refractory technologies are being developed, tested, and placed into operation when viable to achieve longer furnace life. The development of fused-cast chromium refractories in 2000 made it possible to construct and operate oxyfuel furnaces over single campaigns of more than 12 years. Newer technologies, such as cast-in-place chromium refractories are expected to be implemented in the near future in some wool fiberglass furnaces.

²⁷ Email from Lauren.P.Alterman@saint-gobain.com to persons at the EPA, July 27, 2012, 10:32 am.

We collected source testing for all types of furnaces used in the wool fiberglass manufacturing industry. Specifically, each air-gas and oxyfuel furnace was tested, and facilities that operated identical electric furnaces provided testing for one furnace along with design, construction, and refractory information for all furnaces operated. Industry provided schematics of all types of furnace designs showing that while all wool fiberglass furnace ‘tanks’ (holding the molten materials) are constructed of high-chromium refractory, only the gas-fired furnaces are typically constructed from chromium refractories above the molten glass. Upon review of all the data submitted, we found that only gas-fired furnaces are designed in a manner that, during operation, may emit significant amounts of chromium compounds. Because the gas-fired furnaces are the only furnaces in which the chromium refractory is exposed to oxidizing conditions at temperatures exceeding 1,300 °F, gas-fired furnaces clearly demonstrate a greater potential for increased chromium emissions. While the highest emitting glass-melting furnace is located at a major source, note that the design and operation of gas-fired glass-melting furnaces is the same at major and area sources.

The thermal, physical and chemical properties of molten wool fiberglass cause corrosion and erosion to the refractory lining of the glass-melting furnace, and the glass-melting furnace must be constructed of materials capable of resisting this environment. Because oxygen burns very hot, some of the highest refractory performance requirements in the industry are placed upon wool fiberglass oxyfuel glass-melting furnaces.²⁸

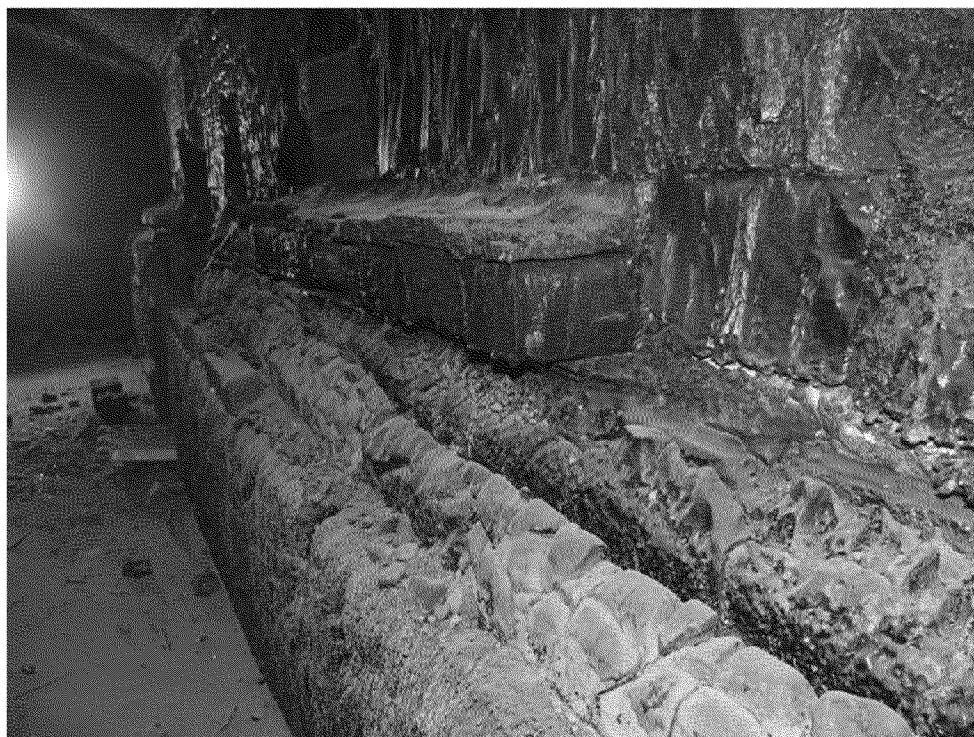


Figure 7. Note the spalling of the chromium refractory at and below the glass line. This is an air gas furnace that is being replaced by an oxyfuel furnace. (Photo courtesy of Owens-Corning).

²⁸ “New High Chrome Fused Cast Refractory for Use in Contact With Highly Corrosive Glasses”, T.A. Myles and F. Knee, in Ceramic Engineering and Science Proceedings, The American Ceramic Society, 1986).

Consequently, an oxyfuel glass-melting furnace used to produce wool fiberglass must be constructed of high-chromium refractories because these are the only types of materials currently available that are suitable for this use and meet the rigorous practical demands of wool fiberglass manufacturing. The industry has commented that the use of high-chromium refractories is economically essential to wool fiberglass manufacturing. Because of the high thermal and chemical stressors in oxyfuel glass-melting furnaces under normal operations, high-chromium refractories are preferred by industry for economical and safe oxyfuel glass-melting furnace operation. Construction using these materials significantly increases the life of the glass-melting furnace. (Region 7, 2011; Saint-Gobain, 2012).

CHROMIUM EMISSIONS INCREASE PROPORTIONAL TO CULLET USE

The wool fiberglass industry has observed that chromium emissions increase with increasing use of cullet (ref). Cullet is waste glass, and may either be internal cullet or external cullet. The industry suggested that this may be due to chromium being released from the green glass portion of cullet upon remelting. However, according to other sources, once chromium has been added to a raw material mixture and melted to form a glass, it is not volatilized upon remelting. In their comments to the EPA's November 25, 2011 proposed RTR rule, NAIMA attached the comments from a technical advisor to the industry and the EPA²⁹. Dr. Brosnan commented on the potential for chromium to be released upon remelting of the cullet in which it had been used as a colorant to impart a green color.

"Chromium is known as a constituent of glasses used for coloring purposes. Chromium enters the silicate network structure of the glass as a modifier' of the network, as it cannot form glass on its own due to thermodynamic constraints. As a modifier, any chromium in the glass is rigidly held in the silicate structure in interstices in the atomic network. Infrared spectroscopy now suggests the chromium is present in coordinated complexes with oxygen³⁰. The result is that chromium is not volatiled from the glass at normal glass melting temperatures³¹. Chromium, which enters glass in (wool fiberglass) furnaces below the glass line, i.e., goes into solution, does not have potential for volatilization. Therefore, it is only potential volatilization from refractories at or above the glass line in furnaces that is of concern in this (Technology Review) report."

The glass chemistry and mechanisms of chromium emissions suggest that chromium emission increase with increasing cullet use due to boride-driven reactivity in the furnace environment. Borides are a required ingredient in the wool fiberglass 'recipe', because the borides impart the properties needed to attenuate, or stretch, the molten glass into fibers that are flexible and springy when cooled. However, as previously stated (NAIMA, 2012; others...), the borides are highly reactive as a chemical species in the furnace environment. When raw minerals

²⁹ Dr. Denis Brosnan of Clemson University, South Carolina. Technology Review. Chromium Emissions from Wool Fiberglass Melting Furnaces, February 1, 2012.

³⁰ C. Nelson, Transition Metal Ions in Glasses: Network Modifiers or Quasi-Molecular Complexes, Mat. Res. Bull. 18 (1983) 959-966.

³¹ Chromium volatilization is only reported in the non-equilibrium melting of glasses at plasma processing temperatures, i.e., with flame temperatures typically reported as above 7000° C (>12,000° F).

predominate the raw material furnace feed mixture, oxides are readily released from those minerals upon the first melting (silicon dioxide, soda ash, etc.) These oxides react freely with the borides in the molten raw material mixture in the furnace environment. However, when cullet is used in place of all or most of the raw minerals, the mixture is starved of available reactants for the borides, and the borides will react with any available oxides. The most available oxide in the reactant-starved furnace environment are the chromium oxides of the refractory.

CONCLUSIONS

In summary, because of the advantages of oxyfuel glass-melting furnaces over other wool fiberglass glass-melting furnace technology described in the preceding discussions, oxyfuel glass-melting furnaces constructed of high-chromium refractories are expected to replace many existing wool fiberglass glass-melting furnaces of other designs (Letter from NAIMA to Ms. Susan Fairchild, EPA, January 28, 2013), particularly as sources of industrial oxygen are sited near wool fiberglass facilities.³²

Consequently, electric glass-melting furnaces do not have the same potential to emit chromium compounds that gas-fired glass-melting furnaces have, and accordingly, many of the chromium test data collected at electric glass-melting furnaces are below the detection level of the emissions measurement method. All of the test data for electric glass-melting furnaces were also below the proposed chromium limit of 6×10^{-5} lb chromium per ton of glass pulled for glass-melting furnaces at major sources, as proposed by the EPA on November 25, 2011 (proposed RTR rule amendments). These data fall well below the final limit of 2.5×10^{-4} lb chromium per ton of glass pulled .

While the furnaces and control technologies are generally the same as those used at promulgation of the MACT standard in 1999, there have been some developments in furnace design and preference in control equipment³³. Air-gas furnaces, once widely used throughout this industry, have been mostly phased out due to high nitrogen oxide (NOx) and PM emissions. In place of the air-gas furnace, oxyfuel furnaces are being constructed because they are more energy efficient, and because they emit NOx and PM at very low levels. Review of the industry literature^{34,35,36,37,38} and public comments indicates that once a source of industrial oxygen is

³² Oxygen-Enhanced Combustion, Baukal, Charles E. Jr., Prince B. Eleazar III, and Bryan C. Hoke, Jr. 1998).

³³ From the EPA's Wool Fiberglass Manufacturing Technology Review Memorandum. Conducted under CAA section 112(d)(6) for chromium. June 2015.

³⁴ U.S. DOE Energy Efficiency and Renewable Energy, Industrial Technologies Program, Final Technical Report. "Compressive Creep and Thermophysical Performance of Refractory Materials". Oak Ridge National Laboratories. June 2006.

³⁵ Oxygen-Enhanced Combustion, Chapter 7. Baukal, Charles E., Jr. 1998.

³⁶ "Advances in Oxyfuel Fired Glass-Melting Technology". Hisashi Kobayashi. January 2004.

³⁷ "When Does Oxyfuel Make Sense?" Russell Hewertson, Combustion Technology, Air Products and Chemicals, Inc., 2005.

³⁸ Diagnostics And Modeling Of High-Temperature Corrosion Of Superstructure Refractories In Oxyfuel Glass Furnaces: Extended Superstructure Refractory Life Will Enhance Oxyfuel Firing Process. Elliott Levine, Office of Industrial Technologies Energy Efficiency and Renewable Energy, U.S. Department of Energy, December 2000.

sited in the vicinity of a wool fiberglass manufacturer, nearby facilities are likely to convert from air-gas or electric to oxyfuel technology.

While chromium refractories were used prior to 1999, the manufacturers of these products had not overcome some significant problems (such as spalling from thermal shock in certain high-temperature applications). As a result, their use was confined to limited areas of the furnace that typically experience low thermal shock or in areas where furnace repairs and refractory replacement could be performed readily. Developments in refractory technology and in furnace design are inextricably linked. Oxyfuel furnaces were not widely used prior to 1999 in the wool fiberglass industry, due to a number of factors, especially refractory degradation in the wool fiberglass furnace environment. The new technology at the time of an oxyfuel furnace constructed using conventional refractories of that time (e.g., alumina-silicate, zirconium) limited the furnace life to 4 or 5 years. With the advent of new refractory technology, life expectancy of new furnaces is expected to be significantly longer. With the industry focus upon new furnace designs and technology, the research to develop refractories that could withstand high temperatures, thermal shock and corrosive materials yielded the development of new types³⁹ of chromium refractory products that are used for construction of oxyfuel furnaces.

As a result, the wool fiberglass industry began a trend toward oxyfuel furnaces constructed using high-chromium refractory products, a trend that NAIMA noted is expected to continue into the future. This gives rise to increased chromium emissions as a result of both wool fiberglass raw material formulation (corrosivity) and associated refractory degradation (i.e., furnace wear). The EPA explained the mechanisms of chromium emissions at length in the April 15, 2011 proposal (78 FR 22379-22382) and in the Technology Review Memorandum for the Wool Fiberglass Manufacturing Source Category that accompanied the April 2013 notice.

DISPOSAL (RECYCLING) OF CHROMIUM REFRACTORY FROM THE FURNACE REBUILD

As has been discussed earlier, the EPA proposed a number of ways in which the wool fiberglass industry may reduce their chromium emissions. Use of a caustic (sodium hydroxide) scrubber at the outlet of the dry electrostatic precipitator (DESP), raw material substitution (i.e., decreased use of cullet with increased use of raw minerals), and rebuild of the furnace before the end of its useful life. This last option predominates in the industry at this time, as technological advances in furnace refractory are developing.

³⁹ Fused-cast chromium refractories and cast-in-place chromium refractories are among the types of chromium refractories in use in the wool fiberglass manufacturing industry since 2000.



Figure 8. A chromium refractory brick which is to be used in the rebuild of a new oxyfuel furnace. The development of very large refractory bricks with very smooth surfaces, extends furnace life by reducing the opportunity for glass breakthrough ('ratholing') at joints and brick to brick surfaces. (Photo courtesy of Owens-Corning).

The outside wall of the glass furnace may be reinforced with up to two layers of refractory blocks before the structural integrity of the furnace is threatened. After this point, when the interior of the furnace wall is eroded sufficiently to threaten breakthrough by the molten glass, the furnace is typically nearing the end of its useful life, and is scheduled for a rebuild.

Due to the toxicity of spent chromium refractories, wool fiberglass manufacturers must either dispose of the spent chromium refractory in accordance with RCRA Hazardous Waste requirements, or recycle these materials, which is typically conducted through the refractory manufacturer. Under RCRA (40 CFR Part 261), owners/operators with a material that meets the definition of Extraction Procedure (EP) Toxicity (that is, carrying a hazardous waste code) must conduct testing on the materials to determine their disposal. Some refractory materials contain chromium compounds as part of the refractory mixture. During operation, some of the chromium compounds will be converted into a hexavalent chromium. This means that the initial installation of the refractory material did not represent a health problem. However, when the refractory needed to be removed it presented a serious health problem. Therefore, when the refractory material is removed it creates a dust that may contain hexavalent chromium. As a result, inhaling the hexavalent chromium increases the risk of lung cancer and may also cause other health hazards.⁴⁰

⁴⁰ "Health and Safety Issues on Brick, Refractory and Insulation. Bases", Gary J., Pres. BRIL, Inc. Copley, Ohio. 11th North American Waste to Energy Conference. 2003.

At least two manufacturers of chromium refractories offer a recycling option to their customers who have previously purchased these products for construction of their glass-melting furnaces. “As concerns about the environmental impact regarding the disposal of chrome refractories grew, NARCO took action and created the RESERV® Reuse Program to provide an alternative to treatment and hazardous waste land-filling for the glass maker.”⁴¹

⁴¹ In Glass Global Community, 2015 (online website news and advertisement). Harbison Walker International. North American Refractories Company. Cherrington Corporate Center, 400 Fairway Drive, 15108 Moon Township, PA.



SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS Standards, Australian WorkSafe, Japanese Industrial Standard JIS Z 7250:2000, and European Directives

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED):

SYNONYMS:

CAS#:

PRODUCT USE:

CHEMICAL SHIPPING NAME/CLASS:

U.N. NUMBER:

MANUFACTURER'S NAME:

DISTRIBUTOR'S NAME:

ADDRESS:

EMERGENCY PHONE:

BUSINESS PHONE:

DATE OF PREPARATION:

DATE OF REVISION:

DATE OF REVIEW:

Chromium (III) Oxide, *Green*

Chromium (III) Oxide; Chromic Oxide; Chrome Oxide Green
1308-38-9

Various uses

Chromium (III) Oxide – **Non-Regulated**

NA

Various Manufacturers

Hunter Chemical LLC

220 Commerce Drive, Suite 405, Fort Washington, PA 19034

(800) 424-9300 (CHEMTREC)

(215) 461-1900

November 18, 2010

October 23, 2013

October 23, 2013

2. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Warning!

Product Description: This product is a Light to Dark Green Crystalline solid with no odor.

Health Hazards: Harmful if swallowed or inhaled. Causes irritation to skin, eyes and respiratory tract.

Flammability Hazards: Non-Flammable product.

Reactivity Hazards: This product is not reactive.

Environmental Hazards: Release of the product is not expected to cause adverse effects to the aquatic environment.

Emergency Recommendations: Emergency responders must have personal protective equipment and fire protection appropriate for the situation to which they are responding.

EU LABELING AND CLASSIFICATION: This product meets the definition of a hazardous substance or preparation according to EU Regulations (EC) No 1272/2008.

EC# 215-160-9 is not classified in the Annex I of Directive 67/548/EEC

COMPONENT(S) DETERMINING HAZARD:

Chromium (III) Oxide

GHS CLASSIFICATIONS:

Skin Sensitization Category 1

Skin Irritation Category 3

Eye Irritation Category 2B

SIGNAL WORD : Warning



HAZARD STATEMENT:

H316 May cause skin irritation

H317 May cause an allergic skin reaction

H320 May cause eye irritation

PREVENTION STATEMENT :

P202 Do not handle until all safety precautions have been read and understood

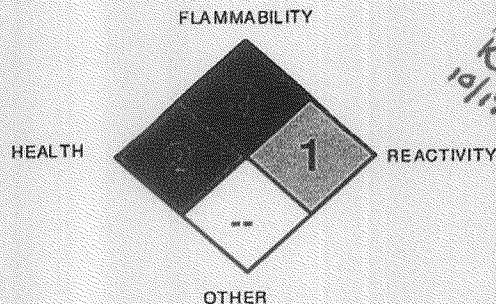
P261 Avoid breathing dust/fume/gas/mist/vapor/spray

P272 Contaminated work clothing should not be allowed out of the workplace

P280 Wear protective gloves/protective clothing/eye protection/face protection

P281 Use personal protective equipment as required

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
[REDACTED]			
[REDACTED]			
REACTIVITY: 1 (YELLOW)			
PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
[Icon]	[Icon]	[Icon]	[Icon]
For Routine Industrial Use and Handling Applications			





SAFETY DATA SHEET

RESPONSE STATEMENT:

P321 Specific treatment is advised – see first aid instructions
P363 Wash contaminated clothing before reuse
P302 + P352 IF ON SKIN: Wash with plenty of soap and water
P308 + P313 IF exposed or concerned: Get medical advice/attention
P333 + P313 IF skin irritation or rash occurs: Get medical advice/attention

HEALTH EFFECTS OR RISKS FROM EXPOSURE:

ACUTE: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching.

CHRONIC: Prolonged or repeated skin contact may cause sensitization dermatitis and possible destruction and/or ulceration. Repeated inhalation may cause chronic bronchitis. A review of studies conducted over 100 years showed no conclusive evidence for a cancer hazard among workers exposed to aerosols formed by chromium metal or Chromium (III) compounds. The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence in humans or experimental animals for the carcinogenicity of Chromium (III) compounds. The overall evaluation concluded that Chromium (III) compounds are not classifiable as to their carcinogenicity to humans.

3. COMPOSITION AND INFORMATION ON INGREDIENTS

Hazardous Ingredients:	WT%	CAS#	EINECS #	Hazard Classification	Risk Phrases
Chromium (III) Oxide	90 - 100%	1308-38-9	215-160-9	[Xi] Irritant	R36/38; R40
Balance of other ingredients is less than 1% in concentration (or 0.1% for carcinogens, reproductive toxins, or respiratory sensitizers).					None

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2010 format. This product has been classified in accordance with the hazard criteria of the CPR and the SDS contains all the information required by the CPR, EU Directives and the Japanese Industrial Standard JIS Z 7250: 2000.

4. FIRST-AID MEASURES

SKIN EXPOSURE: If this product contaminates the skin, begin decontamination with running water. Minimum flushing is for 5 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. The contaminated individual should seek medical attention if any adverse effect occurs.

EYE EXPOSURE: If this product enters the eyes, open contaminated individual's eyes while under gently running water. Use sufficient force to open eyelids. Remove contact lenses if worn. Have contaminated individual "roll" eyes. Minimum flushing is for 15 minutes. Contaminated individual must seek immediate medical attention.

INHALATION: If dusts generated by this product are inhaled, remove contaminated individual to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if breathing distress continues.

INGESTION: Routine use of this product is not expected to cause any situation which could lead to ingestion. If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with pre-existing skin conditions may be aggravated by exposure to this material

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Non-Flammable

AUTOIGNITION TEMPERATURE: Not Applicable

FLAMMABLE LIMITS (in air by volume, %): Lower NA Upper NA

FIRE EXTINGUISHING MATERIALS: Use fire extinguishing methods below:

Water Spray: Yes

Carbon Dioxide: Yes

Foam: Yes

Dry Chemical: Yes

Halon: Yes

Other: Any "C" Class



SAFETY DATA SHEET

UNUSUAL FIRE AND EXPLOSION HAZARDS: Not considered a fire or explosion hazard.

Explosion Sensitivity to Mechanical Impact: No

Explosion Sensitivity to Static Discharge: No

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Proper protective equipment should be used. Stop the flow of material, if this can be done safely. Contain discharged material. For spills of solid material, sweep-up or vacuum spilled solid, minimizing the generation of dust. Place in a proper container for reclamation or disposal. Dispose of in accordance with U.S. Federal, State, and local hazardous waste disposal regulations and those of Canada and its Provinces, those of Australia, Japan and EU Member States (see Section 13, Disposal Considerations).

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing dusts generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: Containers of this product must be properly labeled. Empty containers should be handled with care. Store containers in a cool, dry location. Keep container tightly closed when not in use.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

Chemical Name	CAS#	ACGIH TLV	OSHA TWA
Chromium (III) Oxide	1308-38-9	0.5 mg/m ³ (As Cr Compound)	0.5 mg/m ³ (As Cr Compound)

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Use a chemical fume hood or local exhaust ventilation, and process enclosure if necessary, to control airborne dust. Ensure eyewash/safety shower stations are available near areas where this product is used.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below guidelines listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states.

EYE PROTECTION: Safety glasses or goggles are recommended. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian Standards, and the European Standard EN166, Australian Standards, or relevant Japanese Standards.

HAND PROTECTION: Use chemically-resistant gloves when handling this product. If necessary, refer to U.S. OSHA 29 CFR 1910.138, the European Standard DIN EN 374, the appropriate Standards of Canada, Australian Standards, or relevant Japanese Standards.

BODY PROTECTION: Use body protection appropriate for task (e.g. lab coat, overalls). If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136.

9. PHYSICAL and CHEMICAL PROPERTIES

APPEARANCE (Physical State) and COLOR: Light to dark green crystalline solid with no odor

ODOR: No odor



SAFETY DATA SHEET

ODOR THRESHOLD: Not Applicable
pH: Not Available
MELTING/FREEZING POINT: 2435°C (4415°F)
BOILING POINT: Not Available
FLASH POINT: Not Applicable
EVAPORATION RATE (n-BuAc=1): Not Applicable
FLAMMABILITY (SOILD, GAS): Not Available
UPPER/LOWER FLAMMABILITY OR EXLOSION LIMITS: Not Available
VAPOR PRESSURE (mm Hg @ 20°C (68°F): Not Applicable
VAPOR DENSITY: Not Applicable
RELATIVE DENSITY: Not Available
SPECIFIC GRAVITY: 5.10
SOLUBILITY IN WATER: Negligible
PARTITION COEFFICENT (n-octanol/water): Not Available
AUTO-IGNITION TEMPERATURE: Not Applicable
DECOMPOSITION TEMPERATURE: Not Available
VISCOSITY: Not Applicable

10. STABILITY and REACTIVITY

STABILITY: Stable under conditions of normal storage and use.
HAZARDOUS DECOMPOSITION PRODUCTS: No information found
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Lithium, glycerol
POSSIBILITY OF HAZARDOUS REACTIONS: Will not occur.
CONDITIONS TO AVOID: Incompatible materials, dust generation.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:
Chromium (III) Oxide CAS# 1308-38-9
No Data
SUSPECTED CANCER AGENT: Ingredients within this product are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, or CAL/OSHA and therefore are not considered to be, or suspected to be, cancer-causing agents by these agencies.
CARCINOGENIC EFFECTS: A4 (Not classifiable for human) by ACGIH, 3 (Not classifiable for human.) by IARC.
IRRITANCY OF PRODUCT: This product can be irritating to the skin, eyes, and respiratory system with prolonged contact.
SENSITIZATION TO THE PRODUCT: This product may cause allergic skin reactions.
REPRODUCTIVE TOXICITY INFORMATION: No reports concerning the effects of this product and its components on the human reproductive system.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.
ENVIRONMENTAL STABILITY: When released into the soil, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. No specific data available on this product.
CHEMICAL EFFECT ON PLANTS, ANIMALS AND AQUATIC LIFE: This product is not expected to be harmful to aquatic life in very low concentrations.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.



SAFETY DATA SHEET

14. TRANSPORTATION INFORMATION

US DOT, IATA, IMO, ADR:

U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS: This product is not classified (per 49 CFR 172.101) by the U.S. Department of Transportation.

PROPER SHIPPING NAME:

Chromium (III) Oxide

HAZARD CLASS NUMBER and DESCRIPTION:

NON-REGULATED MATERIAL

UN IDENTIFICATION NUMBER:

NA

PACKING GROUP:

NA

DOT LABEL(S) REQUIRED:

N/A

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER: NA

RQ QUANTITY:

None

MARINE POLLUTANT: The components of this product are not designated by the Department of Transportation to be Marine Pollutants (49 CFR 172.101, Appendix B).

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This product is not considered as dangerous goods.

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This product is not considered as dangerous goods.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is not considered by the United Nations Economic Commission for Europe to be dangerous goods.

15. REGULATORY INFORMATION

UNITED STATES REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The components of this product are Not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for the components of this product. The default Federal SDS submission and inventory requirement filing threshold of 10,000 lbs (4,540 kg) therefore applies, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): None

U.S. TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory or are exempted from listing.

OTHER U.S. FEDERAL REGULATIONS: None

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Ingredients within this product are not on the Proposition 65 Lists.

CANADIAN REGULATIONS:

CANADIAN DSL/NDL INVENTORY STATUS: The components of this product are on the DSL Inventory, or are exempted from listing.

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS:

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all of the information required by those regulations.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: Not Controlled

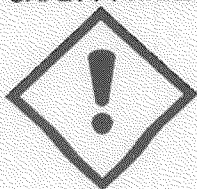
EUROPEAN ECONOMIC COMMUNITY INFORMATION:

EU LABELING AND CLASSIFICATION: This product meets the definition of the following hazard class as defined by the European Economic Community Guidelines.

EU CLASSIFICATION: [Xi] Irritant

EU RISK PHRASES: R36/38: Irritating to eyes and skin; R40: Possible risks of irreversible effects

EU SAFETY PHRASES: S22: Do not breathe dust; S37/39: Wear suitable gloves and eye/face protection





SAFETY DATA SHEET

AUSTRALIAN INFORMATION FOR PRODUCT: The components of this product are listed on the International Chemical Inventory list.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

JAPANESE ENCS INVENTORY: The components of this product are on the ENCS Inventory as indicated in the section on International Chemical Inventories, below.

POISONOUS AND DELETERIOUS SUBSTANCES CONTROL LAW: No component of this product is a listed Specified Poisonous Substance under the Poisonous and Deleterious Substances Control Law.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac: Listed
Australian Inventory of Chemical Substances (AICS): Listed
Korean Existing Chemicals List (ECL): Listed
Japanese Existing National Inventory of Chemical Substances (ENCS): Listed
Philippines Inventory of Chemicals and Chemical Substances (PICCS): Listed
Swiss Giftliste List of Toxic Substances: Listed
U.S. TSCA: Listed

16 OTHER INFORMATION

PREPARED BY: Paul Eigbrett – (**SDS Authoring PLUS**)

DATE OF PRINTING: October 23, 2013

The information contained herein is believed to be accurate but is not warranted to be so. Data and calculations are based on information furnished by the manufacturer of the product and manufacturers of the components of the product. Users are advised to confirm in advance of the need that information is current, applicable and suited to the circumstances of use. Hunter Chemical LLC assumes no responsibility for injury to vendee or third party person proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Furthermore, Hunter Chemical LLC assumes no responsibility for injury caused by abnormal use of this material even if reasonable safety procedures are followed.

END OF SDS SHEET

Material Safety Data Sheet **RESOURCE ALLOYS & METALS, INC.**

Chemical Name Selenium	Common Name Selenium
---------------------------	-------------------------

Section I

Manufacturer's Name Resource Alloys and Metals, Inc.	Emergency Telephone Number 561/790-7200
Address 250 Business Parkway, Suite 1	Telephone Number for Information 561/790-7200
Royal Palm Beach, FL 33411	Date Prepared 08/01/05

Section II – Hazard Ingredients/Identity Information

Hazardous Components	OSHA PEL (mg/m ³)		ACGIH TLV (mg/m ³)		%
	TWA	Ceiling	TWA	STEL	
Selenium	0.2	none	0.2	none	>99.5

Rec'd
11/5/13

Section III – Physical/Chemical Characteristics

Boiling Point	1265° F	Specific Gravity (H ₂ O = 1)	4.81
Vapor Pressure (mm Hg.)	1 @ 673° F	Melting Point	423° F
Vapor Density (AIR = 1)	NA	Evaporation Rate	NA
Solubility in Water	Not soluble	Appearance and Odor	Steel gray, odorless solid

Section IV – Fire and Explosion Hazard Data

Flash Point (Method Used) NA	Flammable Limits Not flammable	LEL NA	UEL NA
Extinguishing Media Class D fire extinguisher, dry chemical or dry sand. Do not use water.			
Special Fire Fighting Procedures Do not use water. Wear SCB apparatus if necessary.			
Unusual Fire and Explosion Hazards Dust may generate fire. Never use water on molten metal or charge wet metal or explosion will occur.			

Section V – Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable (at room temp)	X	Wet or humid conditions
Incompatibility (Materials to Avoid)			
Avoid contact with oxidizing agents. Avoid water with molten metal.			
Hazardous Decomposition or Byproducts			
At elevated temperatures, toxic oxide fumes may be evolved.			

Section VI – Health Hazard Data

Section VI – Health Hazard Data

Route(s) of Entry:	Inhalation? yes	Skin? yes	Ingestion? yes	Eye Contact? yes
Health Hazards Cutting, melting, welding, soldering, or mechanical processing may produce dusts or fumes containing selenium and/or its oxides. Breathing these dusts or fumes may present potentially significant health hazards. Dusts or fumes containing selenium may cause skin or eye irritation. Ingestion of significant amounts of material is unlikely.				
Carcinogenicity:	NTP? yes	IARC? no	OSHA? no	
Signs and Symptoms of Exposure Headache, chills, fever, metallic taste or garlic breath.				
Medical Conditions Generally Aggravated by Exposure Diseases of the kidneys, skin, liver, lungs and gastrointestinal tract.				
Emergency and First Aid Procedures <i>Eye and skin contact</i> – flush eyes with large amounts of water for at least 15 minutes; wash affected area with large amounts of water and soap. <i>Inhaled</i> – remove to fresh air. <i>Ingested</i> – Induce vomiting, give water or milk. In each case, seek medical attention following immediate care.				

Section VII – Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled

If metal is in a molten state, avoid contact with water or moisture. If it is in a solid state, be careful of sharp edges. Vacuum dust.

Precautions to be Taken in Handling and Storing

Use good housekeeping practices to prevent accumulations of dust and keep airborne dust concentrations at a minimum. Avoid breathing dust or fumes. Store metal in a dry area away from incompatible materials. Keep dust away from sources of ignition. Preheat metal when required to evaporate surface moisture prior to melting. Ice, snow, grease, oil or moisture can cause explosions. Remove these contaminants before charging ingot to melting furnace.

Other Precautions

Use safe foundry practices.

Section VIII – Control Measures

Respiratory Protection

A mask/full-face respirator should be worn if air contaminant concentrations exceed exposure limits or if excessive dust concentrations occur.

Ventilation

Provide ventilation necessary to maintain concentrations of air contaminants below recommended levels.

Eye Protection

Goggles should be worn if excessive dust concentrations occur and when working with molten metal.

Protective Clothing

Gloves should be worn to avoid cuts and during operations with significant skin contact (i.e. grinding). Full protective clothing should be worn by workers exposed to heavy concentrations of dust or high heat and during alloying operations to prevent injury from molten metal splashing, spilling, etc.

Work/Hygienic Practices

As necessary to maintain exposures below TLVs and PELs and follow good normal hygienic practices.

Information herein is given in good faith as authoritative and valid; however, no warranties, expressed or implied, can be made.

SAFETY DATA SHEET

SECTION 1 - IDENTIFICATION

PRODUCT NAME: JMB CADMIUM PIGMENT **CP6350**
US D.O.T. / UN NAME: NOT REGULATED FOR TRANSPORT
RECOMMENDED USES: PIGMENT FOR USE IN PLASTICS, ARTISTS' COLORS, PAINTS; COLORING MATERIAL FOR USE IN CERAMICS AND GLASS
NOT FOR USE IN TATTOO INKS, COSMETICS, ANY MEDICAL RELATED APPLICATIONS

COMPANY:
UNITED MINERAL & CHEMICAL CORPORATION
1050 Wall Street West, Ste. 660, Lyndhurst, NJ 07071
Tel: 201-507-3300 Fax: 201-507-1506
e-mail: inquiry@umccorp.com

EMERGENCY TELEPHONE NO.:
USA - CHEMTREC: 1-800-424-9300
OUTSIDE USA: +1 703-527-3887

SECTION 2 - HAZARD IDENTIFICATION

GHS HAZARD CLASSIFICATION:
NOT CLASSIFIED
GHS LABEL ELEMENTS:
SIGNAL WORD: NO SIGNAL WORD
LABEL CODES / PICTOGRAMS: NO PICTOGRAMS
HAZARD STATEMENTS: NONE UNDER GHS CLASSIFICATION

PRECAUTIONARY STATEMENTS :

PREVENTION : NONE ASSIGNED UNDER GHS
RESPONSE : NONE ASSIGNED UNDER GHS
STORAGE : NONE ASSIGNED UNDER GHS
DISPOSAL : NONE ASSIGNED UNDER GHS

OTHER HAZARDS / U.S. - HAZARDS NOT OTHERWISE CLASSIFIED / UN GHS - OTHER HAZARDS WHICH DO NOT RESULT IN CLASSIFICATION:
SEE 29 CFR 1910.1027 FOR THE OSHA CADMIUM STANDARD

NOTE - CADMIUM PIGMENTS ARE MUCH LESS HAZARDOUS THAN OTHER CADMIUM COMPOUNDS AS THEY ARE EXTREMELY INSOLUBLE. THIS GREATLY REDUCES THE RISK OF ABSORPTION OF CADMIUM INTO THE BODY AND ALSO GREATLY REDUCES THEIR ENVIRONMENTAL HAZARD. AS SUCH, THE PRODUCER - JAMES M. BROWN LTD. - HAS NOT CLASSIFIED THEIR CADMIUM PIGMENTS AS HAZARDOUS UNDER THE GHS SYSTEM FOR THE US OR UNDER EU REACH STANDARDS. THE CATEGORY "CADMIUM AND CADMIUM COMPOUNDS" IS REGULATED UNDER VARIOUS U.S. LAWS (SARA 313, CERCLA, RCRA, OSHA CADMIUM STANDARD AT 29 CFR 1910.1027, CALIFORNIA PROPOSITION 65, VARIOUS STATE LISTS, ETC.) AS INDICATED ON THIS SAFETY DATA SHEET.

PER THE OSHA CADMIUM STANDARD - DO NOT EAT, DRINK, SMOKE, CHEW TOBACCO OR GUM, OR APPLY COSMETICS IN REGULATED AREAS, CARRY THE PRODUCTS ASSOCIATED WITH THESE ACTIVITIES INTO REGULATED AREAS, OR STORE SUCH PRODUCTS IN THOSE AREAS. (REGULATED AREA = AREA WHEREVER AN EMPLOYEE'S EXPOSURE TO AIRBORNE CONCENTRATIONS OF CADMIUM IS, OR CAN REASONABLY BE EXPECTED TO BE IN EXCESS OF THE PERMISSIBLE EXPOSURE LIMIT - SEE SECTION 8)

SECTION 3 - COMPOSITION / INFORMATION ON INGREDIENTS

CHEMICAL COMPOSITION:	COMPONENTS:	CAS NO.	%
	AS MIXTURES, ALL COLORS MAY CONTAIN (SEE NOTE 1):		25-100
	C.I. PIGMENT RED 108 - CADMIUM SULFOSELENIDE RED	58339-34-7	
	C.I. PIGMENT ORANGE 20 - CADMIUM SULFOSELENIDE ORANGE	12656-57-4	
	C.I. PIGMENT YELLOW 35 - CADMIUM ZINC SULFIDE YELLOW	8048-07-5	
	PLUS		
	C.I. PIGMENT WHITE 21 - BARIUM SULFATE (SEE NOTE 2)	7727-43-7	0-75
	SYNONYMS: AS LISTED UNDER COMPONENTS		
	CHEMICAL FAMILY: INORGANIC PIGMENTS		

NOTE 1: THESE SUBSTANCES ARE SPECIFICALLY EXCLUDED FROM THE SPECIFIC CLASSIFICATION AND LABELLING ENTRIES IN THE GHS TABLE COVERING CADMIUM COMPOUNDS. THEY HAVE BEEN SELF-CLASSIFIED BY THE PRODUCER AS NOT HAZARDOUS ON THE BASIS OF THEIR PHYSICAL AND CHEMICAL PROPERTIES - PARTICULARLY THEIR EXTREME INSOLUBILITY. A RISK ASSESSMENT CONDUCTED BY THE EU CONCLUDED THAT THESE PRODUCTS OFFER NO SIGNIFICANT HAZARD TO EITHER HUMAN HEALTH OR THE ENVIRONMENT. THEIR REACH REGISTRATION HAS CONFIRMED THAT NO CLASSIFICATIONS APPLY - EITHER FOR HUMAN HEALTH OR THE ENVIRONMENT.

NOTE 2: BARIUM SULFATE IS PRESENT IN EXTENDED / REDUCED STRENGTH (LITHOPONE-LIKE) PIGMENTS/COLORS. IT MAY ALSO BE PRESENT AT LOWER LEVELS IN CADMIUM "PURE" TYPE PIGMENTS TO CONTROL STRENGTH TO CUSTOMERS' STANDARDS.

SECTION 4 - FIRST AID MEASURES

FIRST AID/ RESPONSE	FIRST AID RESPONDERS SHOULD WEAR PERSONAL PROTECTIVE EQUIPMENT
SKIN :	IF ON SKIN: PROMPTLY WASH OFF WITH SOAP & WATER. REMOVE CONTAMINATED CLOTHING. GET MEDICAL ADVICE/ATTENTION IF IRRITATION OCCURS. WASH CONTAMINATED CLOTHING BEFORE REUSE.
EYES :	IF IN EYES: RINSE CAUTIOUSLY WITH WATER FOR SEVERAL MINUTES. REMOVE CONTACT LENSES, IF PRESENT AND EASY TO DO. CONTINUE RINSING. GET MEDICAL ADVICE/ATTENTION IF IRRITATION OCCURS.

N/A = NOT APPLICABLE

LOC

INHALATION : IF INHALED: REMOVE VICTIM TO FRESH AIR AND KEEP AT REST IN A POSITION COMFORTABLE FOR BREATHING. GET MEDICAL ADVISE / ATTENTION IF ANY ADVERSE SYMPTOMS OCCUR.

INGESTION : IF SWALLOWED: RINSE MOUTH WITH WATER, THEN DRINK WATER TO DILUTE. INDUCE VOMITING ONLY UNDER THE DIRECTION OF MEDICAL PERSONNEL. NEVER GIVE ANYTHING BY MOUTH IF THE VICTIM IS UNCONSCIOUS. GET MEDICAL ATTENTION IF LARGE QUANTITY IS INGESTED OR IF YOU FEEL UNWELL.

MOST IMPORTANT SYMPTOMS/EFFECTS, ACUTE AND DELAYED

AS INORGANIC POWDER, INHALATION OF DUST MAY CAUSE DRYNESS OF MOUTH, COUGHING; DUST CONTACT EYES MAY CAUSE IRRITATION / SORENESS. NO SYMPTOMS EXPECTED FROM SKIN CONTACT OTHER THAN TEMPORARY COLORATION OF THE AFFECTED AREA. INGESTION MAY CAUSE SLIGHT IRRITATION OF MOUTH AND THROAT.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED, IF NECESSARY

CALL A POISON CENTER/DOCTOR/PHYSICIAN IN THE EVENT OF MAJOR INHALATION OR INGESTION

SECTION 5 – FIRE FIGHTING MEASURES

SUITABLE EXTINGUISHING MEDIA : **WATER :** (X-AS FOG) **FOAM :** (X) **CO₂ :** (X) **DRY CHEMICAL :** (X)
NON-FLAMMABLE – USE MEDIA SUITABLE FOR THE SURROUNDING AREA

SPECIFIC HAZARDS IN CASE OF FIRE : FIRE CONDITIONS MAY EMIT TOXIC / IRRITATING FUMES (CADMIUM OXIDE, SULFUR DIOXIDE) AND GASES (SULFUR DIOXIDE) UPON THERMAL DECOMPOSITION.

SPECIAL PROTECTIVE EQUIPMENT & PRECAUTION FOR FIRE FIGHTERS : IN CASE OF FIRE INVOLVING THIS MATERIAL, DO NOT ENTER THE FIRE AREA WITHOUT FULL PROTECTIVE EQUIPMENT INCLUDING SELF-CONTAINED BREATHING APPARATUS. STAY UPWIND AND ISOLATE THE AREA OF THOSE WITHOUT PROTECTIVE EQUIPMENT/ RESPIRATORY PROTECTION. COLLECT ALL FIRE CONTROL WATER FOR PROPER DISPOSAL – DO NOT ALLOW IT TO ENTER DRAINS OR WATERWAYS.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS: WEAR FULL PROTECTIVE EQUIPMENT (SEE SECTION 8). KEEP UNPROTECTED PERSONNEL OUT OF THE AREA. REMOVE CONTAMINATED CLOTHING/EQUIPMENT AND WASH THOROUGHLY AFTER HANDLING / CLEANING THE SPILL.

ENVIRONMENTAL PRECAUTIONS: DO NOT RELEASE TO SEWERS, WATERWAYS AND THE ENVIRONMENT. DISPOSE OF PROPERLY VIA LICENSED CHEMICAL WASTEHAULER (SEE SECTION 13).

METHODS AND MATERIAL FOR CONTAINMENT AND CLEAN UP: SCOOP, SHOVEL OR USE A VACUUM WITH A HEPA FILTER TO COLLECT SPILL. AVOID GENERATING DUST; IF NEEDED LIGHTLY DAMP DOWN MATERIAL WITH WATER TO CONTROL DUST LEVELS. PLACE INTO A PROPERLY LABELED IMPERMEABLE BAG/CONTAINER AND SEAL. MATERIAL WILL BE CLASSIFIED AS RCRA HAZARDOUS WASTE AND MUST BE LABELLED IN ACCORDANCE WITH THE OSHA CADMIUM STANDARD - 29 CFR 1910.1027(m)(3)(ii).

SECTION 7 – HANDLING & STORAGE

PRECAUTIONS FOR SAFE HANDLING: WEAR FULL PROTECTIVE EQUIPMENT (SEE SECTION 8). USE WITH ADEQUATE VENTILATION. AVOID SCATTERING INTO THE AIR / GENERATING DUST. CLEAN SPILLS PROMPTLY AND AVOID RELEASE TO THE SEWER SYSTEM/ WATERWAYS/ENVIRONMENT. EMPLOY GOOD HOUSEKEEPING TECHNIQUES TO CONTROL DUST BUILD-UP ON EQUIPMENT AND WORK AREA. REMOVE CONTAMINATED EQUIPMENT/CLOTHING AND WASH THOROUGHLY AFTER HANDLING. KEEP CONTAINER SEALED WHEN NOT IN USE. DO NOT EAT, DRINK, SMOKE, CHEW TOBACCO OR GUM, APPLY COSMETICS WHILE HANDLING OR IN WORK AREA USING THIS PRODUCT.

CONDITIONS FOR SAFE STORAGE, INCLUDING INCOMPATIBILITIES: STORE ONLY IN THE ORIGINAL SEALED CONTAINERS IN A COOL, DRY AREA. STORE AWAY FROM FOOD, DRINK, ANIMAL FEEDSTUFFS. STORE AWAY FROM IGNITION SOURCES, CONCENTRATED ACIDS AND POWERFUL OXIDIZING AGENTS.

SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

CONTROL PARAMETERS: SEE 29 CFR 1910.1027 FOR THE OSHA CADMIUM STANDARD

EXPOSURE LIMITS: U.S. OSHA PEL : 0.0025 mg/m³ TWA ACTION LEVEL AS Cd; 0.005 mg/m³ TWA, AS Cd; 0.2 mg/m³ TWA AND 0.6 mg/m³ CEILING LIMIT AS Cd DUST FOR DRY COLOR FORMULATORS; 0.2 mg/m³ TWA SELENIUM COMPOUND AS Se; 15 mg/m³ TWA TOTAL DUST AS BARIUM SULFATE, 5 mg/m³ TWA RESPIRABLE FRACTION AS BARIUM SULFATE

U.S. ACGIH TLV : 0.01 mg/m³ TWA, INHALABLE AS Cd, 0.002 mg/m³ TWA RESPIRABLE AS Cd; 0.2 mg/m³ TWA SELENIUM COMPOUND, AS Se; 10 mg/m³ TWA TOTAL DUST AS BARIUM SULFATE

APPROPRIATE ENGINEERING CONTROLS : USE LOCAL / MECHANICAL EXHAUST TO MAINTAIN AIR CONCENTRATIONS BELOW OCCUPATIONAL EXPOSURE STANDARDS (SEE ABOVE)

PERSONAL PROTECTIVE EQUIPMENT:

RESPIRATORY PROTECTION : HALF MASK AIR-PURIFYING RESPIRATOR EQUIPPED WITH A HIGH EFFICIENCY PARTICULATE AIR FILTER FOR AIRBORNE CONCENTRATIONS UP TO TEN TIMES THE PERMISSIBLE EXPOSURE LIMIT (SEE 29 CFR 1910.1027(g) FOR PROPER EQUIPMENT FOR HIGHER EXPOSURE LEVELS)

HAND PROTECTION : USE CHEMICAL RESISTANT GLOVES (RUBBER, PVC)

EYE PROTECTION : VENTED GOGGLES OR FULL FACE SHIELD OR OTHER APPROPRIATE PROTECTIVE EQUIPMENT THAT COMPLIES WITH 29 CFR 1910.133; ACCESS TO AN EYEWASH FOUNTAIN

OTHER PROTECTIVE EQUIPMENT : LABCOAT; COVERALLS TO PROTECT SKIN; HEAD COVERINGS, BOOTS OR FOOT COVERINGS; ACCESS TO A SAFETY DRENCH SHOWER

N/A = NOT APPLICABLE

LOC

SECTION 9- PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE :	YELLOW, ORANGE, RED OR MAROON COLORED POWDER	FLAMMABLE LIMITS :	LEL: & UEL: (N/A)
ODOR :	NO ODOR	VAPOR PRESSURE (mm Hg) :	N/A
ODOR THRESHOLD :	N/A	VAPOR DENSITY (AIR=1) :	N/A
pH (5% IN WATER) :	APPROX. 7	RELATIVE DENSITY/SPECIFIC GRAVITY :	3.5 – 5.5
MELTING POINT / FREEZING POINT (°C) :	N/A	SOLUBILITY IN WATER (@20°C) :	INSOLUBLE
BOILING POINT (°C) :	N/A	PARTITION COEFFICIENT (n-OCTANOL/WATER) :	NO DATA AVAILABLE
FLASH POINT (°F) :	N/A	AUTO IGNITION TEMP. (°C) :	NOT KNOWN
EVAPORATION RATE :	N/A	DECOMPOSITION TEMP. :	>300 (572°F)
FLAMMABILITY :	NOT FLAMMABLE	VISCOSITY :	N/A

SECTION 10 – STABILITY AND REACTIVITY

REACTIVITY :	MAY REACT WITH STRONG ACIDS YIELDING TOXIC/FLAMMABLE HYDROGEN SULFIDE GAS, TOXIC HYDROGEN SELENIDE AND POSSIBLY SOLUBLE TOXIC CADMIUM SALTS
CHEMICAL STABILITY :	STABLE WHEN STORED IN SEALED PACKAGE UNDER RECOMMENDED STORAGE CONDITIONS
POSSIBILITY OF HAZARDOUS REACTIONS :	HAZARDOUS POLYMERIZATION WILL NOT OCCUR
CONDITIONS TO AVOID :	CONTACT WITH INCOMPATIBLES; HIGH HEAT (≥20°C or 536°F); DUST IN VICINITY OF IGNITION SOURCES, ELECTRICAL OR SPARK GENERATING EQUIPMENT
INCOMPATIBLE MATERIALS :	CONCENTRATED ACIDS, STRONG OXIDIZING AGENTS
HAZARDOUS DECOMPOSITION PRODUCTS :	FIRE/THERMAL DECOMPOSITION CAN PRODUCE HAZARDOUS FUMES (CADMIUM OXIDE, SELENIUM DIOXIDE) AND GASES (SULFUR DIOXIDE)

SECTION 11 – TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS:	
ROUTES OF EXPOSURE :	SKIN, EYES, INHALATION, INGESTION
SKIN, EYES, INHALATION :	INHALATION OF DUST MAY CAUSE RESPIRATORY IRRITATION. DUST CONTACT WITH EYES MAY CAUSE IRRITATION.
INGESTION :	THIS ROUTE OF EXPOSURE IS NOT LIKELY. NO KNOWN EFFECTS.
CHRONIC:	GROSS OVEREXPOSURE OVER MANY YEARS MAY LEAD TO KIDNEY DAMAGE BUT THIS SHOULD NEVER HAPPEN GIVEN MODERN WORKING CONDITIONS
ACUTE TOXICITY :	A RANGE OF VAULES HAVE BEEN REPORTED FOR SEVERAL SPECIES. ORAL LD ₅₀ VALUES ARE NORMALLY >5000 mg/kg
SKIN CORROSION / IRRITATION :	NOT EXPECTED TO BE IRRITATING
SERIOUS EYE DAMAGE / IRRITATION :	NO TEST DATA AVAILABLE; MAY CAUSE IRRITATION BUT BELOW GHS CLASSIFICATION
RESPIRATORY OR SKIN SENSITIZATION :	NOT EXPECTED TO BE SENSITIZING
GERM CELL MUTAGENICITY :	NO TEST DATA AVAILABLE; PRODUCER HAS NOT CLASSIFIED AS MUTAGEN
CARCINOGENICITY :	U.S. LISTED CARCINOGEN: NONE () OSHA (*) NTP (*) IARC (*) OTHER (*) AS GENERIC CLASS OF "CADMIUM AND CADMIUM COMPOUNDS": OSHA-Ca: CARCINOGEN DEFINED WITH NO FURTHER CATEGORIZATION; NTP-K: KNOWN TO BE A HUMAN CARCINOGEN; IARC-1: CARCINOGENIC TO HUMANS PRODUCER HAS ASSIGNED NO GHS CLASSIFICATION DUE TO THE EXTREME INSOLUBILITY OF CADMIUM PIGMENTS AS COMPARED TO OTHER CLASSIFIED SOLUBLE COMPOUNDS
REPRODUCTIVE TOXICITY :	NO GHS HAZARD CLASSIFICATION
SPECIFIC TARGET ORGAN TOXICITY :	SINGLE EXPOSURE: NO GHS HAZARD CLASSIFICATION; REPEATED/CHRONIC EXPOSURE: NO GHS HAZARD CLASSIFICATION-GROSS OVEREXPOSURE OVER MANY YEARS MAY LEAD TO KIDNEY DAMAGE
ASPIRATION HAZARD :	NO DATA AVAILABLE; NO GHS HAZARD CLASSIFICATION
INTERACTIVE EFFECTS:	NO DATA AVAILABLE

SECTION 12 – ECOLOGICAL INFORMATION

ECOTOXICITY :	THE EXTREME INSOLUBILITY OF THESE PIGMENTS INDICATE THAT THEY OFFER NO SIGNIFICANT HAZARD. NO ACTUAL TESTING HAS BEEN DONE AND AS SUCH, IT IS RECOMMENDED TO AVOID RELEASE TO THE ENVIRONMENT AND WATERWAYS.
TOXICITY - AQUATIC :	NO TEST DATA AVAILABLE
TOXICITY TO DAPHNIA :	NO TEST DATA AVAILABLE
TOXICITY - TERRESTIAL :	NO TEST DATA AVAILABLE
PERSISTANCE & DEGRADABILITY:	HIGHLY STABLE INSOLUBLE INORGANIC COMPOUND – NOT EXPECTED TO DEGRADE IN THE ENVIRONMENT; NOT WITHIN THE DEFINITION OF PBT OR vPvB
BIOACCUMULATIVE POTENTIAL :	HIGHLY INSOLUBLE IN BOTH WATER AND ALL ORGANIC SOLVENTS – NOT EXPECTED TO BIOACCUMULATE
MOBILITY IN SOIL :	MOVEMENT OF THESE HIGHLY INSOLUBLE PRODUCTS THROUGH THE SOIL WILL ONLY OCCUR BY PHYSICAL MOVEMENT OF THE MATERIAL ITSELF.
OTHER ADVERSE EFFECTS :	NO FURTHER DATA AVAILABLE

SECTION 13 – DISPOSAL CONSIDERATIONS**DISPOSAL METHODS:**

DISPOSE OF CONTENTS / CONTAINER IN ACCORDANCE WITH LOCAL, REGIONAL, NATIONAL, INTERNATIONAL REGULATIONS. DISPOSE OF IN SEALED, IMPERMEABLE CONTAINERS, USING A LICENSED CHEMICAL WASTE HAULER. PER THE OSHA CADMIUM STANDARD, THE WARNING LABELS FOR CONTAINERS OF CONTAMINATED PROTECTIVE CLOTHING, EQUIPMENT, WASTE, SCRAP, OR DEBRIS SHALL INCLUDE AT LEAST THE FOLLOWING INFORMATION: DANGER CONTAINS CADMIUM MAY CAUSE CANCER CAUSES DAMAGE TO LUNGS AND KIDNEYS AVOID CREATING DUST

SECTION 14 – TRANSPORT INFORMATION

BY ROAD OR RAIL - U.S. D.O.T. REGULATED: YES () NO (X) RQ: (N/A)
 IF REGULATED, UN PROPER SHIPPING NAME: HAZARD CLASS: ()
 UN IDENTIFICATION NO.: () PACKING GROUP: () LABEL REQUIRED: ()
 U.S. MARINE POLLUTANT: YES () NO (X*) SEVERE U.S. MARINE POLLUTANT: YES () NO (X)
 EMERGENCY RESPONSE GUIDE NO.: ()
 INLAND B/L:
 *THOUGH THE GENERIC CATEGORY OF "CADMIUM AND CADMIUM COMPOUNDS" IS ON THE U.S. MARINE POLLUTANT LIST, CADMIUM PIGMENTS ARE NOT UN CLASSIFIED MARINE POLLUTANTS.

BY SEA - IMDG REGULATED: YES () NO (X) STOWAGE CATEGORY: N/A
BY AIR - IATA REGULATED: YES () NO (X) PKG INSTRUCTION NO.: N/A
SPECIAL PRECAUTIONS: READ SDS BEFORE HANDLING

SECTION 15 – REGULATORY INFORMATION

U.S. TSCA: WE CERTIFY THAT ALL COMPONENTS OF THIS PRODUCT ARE REGISTERED UNDER THE REGULATIONS OF THE TOXIC SUBSTANCES CONTROL ACT.

U.S. SARA TITLE III, SECT. 313 : LISTED (X*) NOT LISTED () *ALL COLORS ARE LISTED AS CADMIUM COMPOUNDS. YELLOWS ARE ALSO LISTED AS ZINC COMPOUNDS. ORANGES, REDS, MAROONS ARE ALSO LISTED AS SELENIUM COMPOUNDS.

U.S. RCRA HAZARDOUS WASTE : NO (*) YES () RCRA # : (*) *WASTE PRODUCT SHOULD BE TESTED (TCLP METHOD) TO SEE IF IT MEETS THE DEFINITION OF UNLISTED HAZARDOUS WASTE, CHARACTERISTIC OF TOXICITY FOR CADMIUM, D006. THE PIGMENT ITSELF, DUE TO ITS HIGH INSOLUBILITY, DOES NOT MEET THE SOLUBLE LEVEL FOR CADMIUM TO BE CLASSIFIED AS RCRA HAZARDOUS WASTE. WASTE LABELLING IS STILL REQUIRED UNDER THE OSHA CADMIUM STANDARD (SEE SECTION 13).

U.S. CERCLA : NO () YES (X*) RQ (*) *AS PART OF THE GENERIC CATEGORY "CADMIUM AND COMPOUNDS" WITH NO RQ ASSIGNED TO THE GENERIC BROAD CLASS

U.S. CALIFORNIA PROPOSITION 65 LISTED : YES (X*) NO () *AS PART OF THE GENERIC CATEGORY "CADMIUM AND COMPOUNDS"

HMIS: HEALTH (2) FLAMMABILITY (0) REACTIVITY (0)

SECTION 16 – OTHER INFORMATION

REVISION DATE: MAY 22, 2015 **PREPARED BY:** EHSA COORDINATOR / UNITED MINERAL & CHEMICAL CORP.

ABBREVIATIONS / ACRONYMS: N/A=NOT APPLICABLE; LEL=LOWER EXPLOSION LIMIT; UEL=UPPER EXPLOSION LIMIT; PEL=PERMISSIBLE EXPOSURE LIMIT; STEL=SHORT TERM EXPOSURE LIMIT; TLV=THRESHOLD LIMIT VALUE; TWA=TIME WEIGHTED AVERAGE OVER 8 HOUR WORKDAY; LD₅₀ OR LC₅₀=LETHAL DOSE OR LETHAL CONCENTRATION THAT KILLS 50% OF DOSED GROUP; mg=MILLIGRAM; g=GRAM; kg=KILOGRAM; PPM=PARTS PER MILLION; m=METER; LOAEL=LOWEST OBSERVED ADVERSE EFFECT LEVEL; C.I.=COLOUR INDEX

IN ACCORDANCE WITH GOOD PRACTICES OF PERSONAL HYGIENE, HANDLE WITH DUE CARE AND AVOID ANY UNNECESSARY CONTACT WITH THIS PRODUCT. USE RECOMMENDED PERSONAL PROTECTION WHEN HANDLING (SEE SECTION 8).

THIS INFORMATION IS BEING SUPPLIED TO YOU UNDER OSHA "RIGHT TO KNOW" REGULATION 29 CFR 1910.1200 AND IS OFFERED IN GOOD FAITH AS TYPICAL VALUES AND NOT AS PRODUCT SPECIFICATION. THE INFORMATION IS BELIEVED TO BE TRUE AND ACCURATE. NO WARRANTY, EXPRESSED OR IMPLIED, REGARDING THE ACCURACY OF THIS DATA, THE HAZARD CONNECTED WITH USE OF THE MATERIAL, OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF, IS MADE. UNITED MINERAL & CHEMICAL CORPORATION AND ITS SUPPLIERS ASSUME NO RESPONSIBILITY FOR DAMAGE OR INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN.
 UNITED MINERAL & CHEMICAL CORPORATION



Safety Data Sheet

In accordance with CFR 1910.1200 (OSHA HCS)

Date of review: June 2, 2015

SDS No. 150

1 Identification of substance and company

Product name:
Product code:
Relevant use and restrictions on use:
Manufacturer/Supplier:

Arsenic (III) oxide
11471, 11608, 17523, 18864, 90916
Research and product development
Noah Technologies Corporation
1 Noah Park
San Antonio, Texas 78249-3419
Phone: 210-691-2000
Fax: 210-691-2600
Web site: www.noahtech.com
CHEMTREC
800-424-9300

Emergency information:

2 Hazards identification

Emergency Overview:



Signal word(s):

Pictogram(s):

Hazard statements:

Precautionary statements:

Hazards not otherwise classified:

Ingredients of unknown acute toxicity:

GHS Classification:

HMIS ratings (scale 0-4):

Danger
Skull and crossbones
Health hazard
Corrosion
Environment
H300 Fatal if swallowed
H314 Causes severe skin burns and eye damage
H318 Causes serious eye damage
H350 May cause cancer
H410 Very toxic to aquatic life with long lasting effects
P260 Do not breathe dust or mist
P264 Wash skin thoroughly after handling
P270 Do not eat, drink or smoke when using this product
P273 Avoid release to the environment
P280 Wear protective gloves/protective clothing/eye protection/face protection
P301/310/330 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Rinse mouth.
P303/361/353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304/340/310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/physician
P305/351/338/310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.
None
None
Acute toxicity, Oral - 2
Skin corrosion - 1B
Serious eye damage - 1
Carcinogenicity - 1A
Acute aquatic toxicity - 1
Chronic aquatic toxicity - 1
Health hazard: 3+
Flammability: 0
Physical hazard: 0

3 Composition/information on ingredients

Chemical name: Arsenic (III) oxide
Designation: 1327-53-3
CAS number: 215-481-4
EC number: As₂O₃
Formula: Arsenic trioxide, arsenious acid
Synonyms: Arsenic (III) oxide
Ingredients of known acute toxicity:

Rec'd
8/10/15

4 First aid measures

After inhalation:	Move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
After skin contact:	Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.
After eye contact:	Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.
After ingestion:	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
Information for doctor:	Show this safety data sheet to the doctor in attendance
Symptoms/effects; acute and delayed:	Ingestion results in marked irritation of the stomach and intestines with nausea, vomiting, and diarrhea. In severe cases, the vomitus and stools are bloody and the patient goes into collapse and shock with weak, rapid pulse, cold sweats, coma and death. Chronic poisoning may manifest itself in different ways. There may be disturbances of the digestive system such as cramps, nausea, constipation, or diarrhea. Liver damage may occur. Disturbances of the blood, kidneys and nervous system may occur.
Immediate medical attention and special treatment needed:	See above

5 Fire-fighting measures

Suitable and unsuitable extinguishing agents:	Water spray, alcohol-resistant foam, dry chemical or carbon dioxide
Special hazards caused by the material, its products of combustion or resulting gases:	Oxides of arsenic
Special fire fighting procedures:	Wear self-contained breathing apparatus and fully protective fire fighting equipment/clothing
Unusual fire and explosion hazard:	No available data

6 Accidental release measures

Person-related safety precautions:	Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Measures for environmental protection:	Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
Measures for cleaning/collecting:	Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for proper disposal.
Additional information:	See Section 7 for information on safe handling See Section 8 for information on personal protective equipment See Section 13 for information on disposal See Section 15 for regulatory information

7 Handling and storage

Information for safe handling:	Avoid contact with skin and eyes. Avoid dust formation. Provide appropriate exhaust ventilation.
Information about protection against explosions and fires:	No data available
Storage requirements to be met by storerooms and containers:	Keep container tightly closed in a dry and well-ventilated place
Incompatibility (avoid contact with):	Strong acids and oxidizers. Reacts rigorously with rubidium carbide, chlorine trifluoride, fluorine, mercury, sodium chlorate, tannic acid, inter-halogens
Further information about storage conditions:	May decompose on exposure to moist air or water

8 Exposure controls/personal protection

Ventilation requirements:	Local exhaust, chemical fume hood
Components with exposure limits that require monitoring:	OSHA PEL: TWA 0.01 mg(As)/m ³ ACGIH TLV: TWA 0.01 mg(As)/m ³ ; Target organs; liver, kidneys, skin, CNS, respiratory system, lungs
Additional information:	No additional data available
General protective and hygienic measures:	The usual precautionary measures for handling chemicals should be adhered to Keep away from foodstuffs, beverages and food Instantly remove any soiled and impregnated garments Wash hands during breaks and at the end of the work Avoid contact with the eyes and skin
Personal protective equipment:	
Respiratory protection:	Filter-dust, fume, mist; respirator equipped with HEPA
(Use only NIOSH or CEN approved Equipment)	
Hand protection:	Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique.
Eye protection:	Safety glasses, goggles
Skin protection:	Completely covering work attire with full length apron
Additional protective equipment:	Sufficient to prevent contact. Emergency eyewash and safety shower
Precautionary labeling:	Wash thoroughly after handling Do not get in eyes, on skin or on clothing Do not breathe dust, vapor, mist, gas Keep away from heat, sparks, and open flames Empty container may contain hazardous residues

9 Physical and chemical properties

Physical state:	Powder
Color:	White to off-white
Odor:	Odorless
Odor threshold:	Not determined
Molecular Weight (Calculated):	197.84
pH	Not determined
Melting point/freezing point/range:	312.3 C
Boiling point/range:	457.2 C
Sublimation temperature/start:	Not determined
Decomposition temperature:	Not determined
Flammability (solid, gas):	Not determined
Flash point:	Not determined
Autoignition temperature:	Not determined
Danger of explosion:	Not determined
Flammable limits:	
Lower:	Not determined
Upper:	Not determined
Evaporation Rate:	Not determined
Vapor pressure (mm Hg):	0.000001 mm Hg @ 66 C
Vapor density:	Not determined
Specific gravity:	3.738
Bulk density:	Not determined
Solubility in/Miscibility with water:	37 g/L @ 20 C
Partition coefficient n-octanol/water:	log Pow: 5
Viscosity:	Not determined
Other information:	Not determined

10 Stability and reactivity

Reactivity:	Not determined
Chemical stability:	Stable under recommended storage conditions
Possibility of hazardous reactions:	Not determined
Conditions to be avoided:	Heat, contact with incompatibles
Materials to be avoided:	See section 7 for information on proper handling and storage
Dangerous reactions:	Reacts rigorously with rubidium carbide, chlorine trifluoride, fluorine, mercury, sodium chlorate, tannic acid, inter-halogens
Hazardous decomposition products: (thermal and other)	Oxides of arsenic

11 Toxicological information

LD/LC50 values that are relevant for classification:	oral-rat LD ₅₀ : 14.6 mg/kg
Irritation or corrosion of skin:	No data available
Irritation or corrosion of eyes:	No data available
Primary irritant or corrosive effect:	
on the skin:	Causes severe skin burns
on the eye:	Causes serious eye damage
Sensitization:	No data available
Potential health effects:	
Inhalation:	May cause serious respiratory tract damage
Ingestion:	Severe irritation of the stomach and intestines
Skin:	Severe skin burns
Eyes:	Serious eye damage
Signs and symptoms of exposure:	Ingestion results in marked irritation of the stomach and intestines with nausea, vomiting, and diarrhea. In severe cases, the vomitus and stools are bloody and the patient goes into collapse and shock with weak, rapid pulse, cold sweats, coma and death. Chronic poisoning may manifest itself in different ways. There may be disturbances of the digestive system such as cramps, nausea, constipation, or diarrhea. Liver damage may occur. Disturbances of the blood, kidneys and nervous system may occur. To the best of our knowledge the acute and chronic toxicity of this substance is not fully known
Carcinogenicity:	EPA-A: Human carcinogen: sufficient evidence from epidemiologic studies IARC-1: Carcinogenic to humans: sufficient evidence of carcinogenicity NTP-1: Known to be carcinogenic: sufficient evidence from human studies Carcinogen as defined by OSHA ACGIH-A1: Confirmed human carcinogen: Agent is carcinogenic to humans based on epidemiologic studies RTECS contains tumorigenic and/or carcinogenic and/or neoplastic data for components in this product
Additional information:	

12 Ecotoxicological information

Toxicity:	Rainbow trout LC50: 21,000 ug/L:96H
Toxicity to fish:	
Toxicity to daphnia and other aquatic invertebrates:	Daphnia magna EC50: 6.23 mg/L:24H
Toxicity to algae:	No data available
Persistence and degradability:	

Biodegradability:	No data available
Bioaccumulative potential:	
Bioaccumulation:	Bioconcentration factor (BCF): 236
Mobility in soil:	No data available
Other adverse effects:	Very toxic to aquatic life with long lasting effects

13 Disposal considerations

Recommendation:	Consult state, local or national regulation for proper disposal Allow professional disposal company to handle waste Must be specially treated under adherence to official regulations
Unclean packagings recommendation:	Disposal must be made according to official regulations

14 Transport information

Land transport DOT



Proper shipping name:	Arsenic trioxide
Technical name:	
DOT Hazard Class:	6.1
Subsidiary risk:	
UN Identification number:	UN1561
Label(s):	Toxic
Packing group:	II
Reportable quantity (RQ):	0.454 kg
Warning label(s):	5, 7, 12
North American Emergency Response Guidebook No.:	151
Notes:	

Air transport ICAO-TI and IATA-DGR:



Proper shipping name:	Arsenic trioxide
Technical name:	
DOT Hazard Class:	6.1
Subsidiary risk:	
UN Identification number:	UN1561
Label(s):	Toxic
Packing group:	II
Reportable quantity (RQ):	0.454 kg
Warning label(s):	5, 7, 12
North American Emergency Response Guidebook No.:	151
Notes:	FedEx requires DOT-SP-8249

UPS Ground / FedEx Ground



Proper shipping name:	Arsenic trioxide
Technical name:	
DOT Hazard Class:	6.1
Subsidiary risk:	
UN Identification number:	UN1561
Label(s):	DOT-SP-8249
Packing group:	II
Reportable quantity (RQ):	0.454 kg
Warning label(s):	5, 7, 12
North American Emergency Response Guidebook No.:	151
Notes:	DOT-SP-8249, MP 2A, 3 or 4, 173.212

UPS Air



Proper shipping name:	Arsenic trioxide
Technical name:	6.1
DOT Hazard Class:	
Subsidiary risk:	UN1581
UN Identification number:	DOT-SP-8249
Label(s):	II
Packing group:	0.454 kg
Reportable quantity (RQ):	5, 7, 12
Warning label(s):	
North American Emergency Response	151
Guidebook No.:	DOT-SP-8249; Max Qty 25 kg; MP 2A, 3 or 4; 173.212
Notes:	

15 Regulatory information

SARA Section 302 Extremely Hazardous
components and corresponding TPQs:
SARA Section 311 / 312 hazards:
SARA Section 313 components:

California Proposition 65 components:

TSCA:

Subject to established reporting levels; 100 lb TPQ (lower threshold), 10,000 lb TPQ (upper threshold)
Acute Health Hazard, Chronic Health Hazard
This product contains chemical(s) subject to the reporting requirements of Section 313 of the Emergency
Planning & Community Right-to-know Act of 1986 and 40CFR372
WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects
or other reproductive harm
Product is listed on TSCA Inventory

16 Other information

The above information is accurate to the best of our knowledge. However, since data, safety standards and government regulation are subject to change and the conditions of handling and use, or misuse are beyond our control. NOAH MAKES NO WARRANTY, EITHER EXPRESSED OR IMPLIED, WITH RESPECT TO THE COMPLETENESS OR CONTINUING ACCURACY OF THE INFORMATION CONTAINED HEREIN AND DISCLAIMS ALL LIABILITY FOR RELIANCE THEREON. User should satisfy himself that he has all current data relevant to his particular use.

Review date: June 2, 2015

PRINCEMINERALS®

MATERIAL SAFETY DATA SHEET

Prince Minerals, Inc.
14 E 44th St
5th Floor
New York, NY 10017

CONTACT NUMBERS:
Prince Environmental, Health & Safety:
(646) 747-4176
CHEMTREC (24-hrs): (800) 424-9300

Section I: Product Information

Identity: CHROMITE *lion*
Synonyms: CHROME ORE, CHROMITE ORE, IRON
CHROMITE; CHROME SAND
Trade Names: CHROMOX; ChromeCAST;
Revision Date: 02/2011

HMIS

Health- 2
Flammability- 0
Reactivity- 0
Personal Protection:



Section II: Composition

<u>Chemical Name:</u>	<u>CAS #</u>	<u>Percent</u>
Chrome Ore (Cr_2FeO_4) or Cr_2O_3	1308-31-2	100

*Rec'd
2/19/13*

Section III: Health Hazard Data

Component	CAS	% By Wt	OSHA PEL (mg/m ³)	OSHA Ceiling	ACGIH TLV (as Cr)	ACGIH STEL	Listed Carcinogen		
							NTP	IARC	OSHA
Chrome Ore	1308-31-2	100	1 (as Cr)	N/A	0.05 (as Cr)	N/A	N	Y*	N

* IARC Group: Not classifiable as carcinogenic to humans

Emergency Overview: Not a fire or spill hazard. Low toxicity- Dry dust is a nuisance particulate. Generally, health effects are provided for exposure to dust that may be generated during product transfer and handling.

Primary Route of Exposure:

Inhalation

Relevant Routes of Exposure:

EYE CONTACT: Particulate may cause slight to moderate irritation. Abrasive action of dust particulate can damage eye.

SKIN CONTACT: Prolonged or repeated contact may cause slight to moderate irritation.

INHALATION: Overexposure by inhalation of airborne particulate, dust, or fumes is irritating to the nose, throat, and respiratory tract. Inhalation of excessive levels of dust or fumes may be harmful.

INGESTION: Unlikely route of exposure; no hazard in normal industrial use. Small amounts (< tablespoonful) swallowed during normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. If ingested in sufficient quantity, may cause gastrointestinal disturbances. Symptoms may include irritation, nausea, vomiting, abdominal pain, and diarrhea.

Acute and Chronic effects of Exposure:

Excessive, short-term exposure to airborne mineral dusts and particulate may cause upper respiratory and eye irritation. Excessive, long-term inhalation of airborne mineral dusts and particulate may contribute to the development of bronchitis, reduced breathing capacity, and may lead to the increased susceptibility to lung disease.

Signs and Symptoms of Exposure:	(Dust) tearing of eyes, burning sensation in the throat, cough, and chest discomfort.
Aggravation of Pre-existing Conditions:	The excessive inhalation of mineral dust may aggravate pre-existing chronic lung conditions such as, but not limited to, bronchitis, emphysema, and asthma.
Reproductive Hazards:	Not a reproductive hazard.

Section IV: First Aid

Emergency and First Aid Procedures:	<p>EYE CONTACT: Flush eyes immediately with water for at least 15 minutes. Seek medical attention if irritation persists.</p> <p>SKIN CONTACT: Immediately wash affected area with mild soap and water to remove any dust adhering to the skin. Seek medical attention if irritation develops or persists.</p> <p>INHALATION: If exposed to excessive levels of dust or fumes, remove to fresh air and seek medical attention if cough or other symptoms develop. If not breathing, give artificial respiration or give oxygen by trained personnel, and get medical attention.</p> <p>IF INGESTED: Unlikely route of exposure. If ingested in sufficient quantity and victim is conscious, give 1-2 glasses of water or milk. Never give anything by mouth to an unconscious person. Leave decision to induce vomiting to qualified medical personnel, since particles may be aspirated into the lungs. Seek immediate medical attention.</p>
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Section V: Fire and Explosion Hazard Data

Emergency Overview:	Not a fire or spill hazard. Low toxicity; dry dust is a nuisance particulate. Generally, health effects are provided for exposure to dust that may be generated during product transfer and handling.
Flammable Properties:	Material will not burn. No unusual fire or explosion hazards.
Extinguishing Media:	Use extinguishing media appropriate to combustibles in the surrounding area.
Protection for Firefighters:	Wet material should be kept out of eyes and off skin. As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Material does not give off toxic fumes in a fire unless molten.

Section VI: Accidental Release

Containment:	Product is a dry solid (granular or powder) and not readily soluble in water. However, prevent spilled product from entering streams, water bodies, and wastewater systems.
Cleanup:	Vacuum or sweep up dry material and place in a container for reuse. Avoid creating excessive airborne dust. It is recommended that cleanup personnel wear approved respiratory protection, gloves, long sleeved clothing and goggles to prevent irritation from contact and inhalation.
Collection:	If possible, collect and reuse spilled product.
Evacuation:	Isolate hazard area. Keep unnecessary and unprotected personnel from entering area.
Potential Environmental Effects:	Derived from natural ores; no adverse environmental effects known. However, prevent spilled product from entering streams, water bodies, and wastewater systems

Section VII: Precautions for Safe Handling and Use

Handling:	Minimize dust generation and accumulation. Avoid breathing dust. Avoid contact with skin and eyes.
Storage:	Store in cool, dry area. Keep container closed when not in use.
Waste Disposal:	If possible, collect and reuse spilled product. Disposal Method: Follow all applicable Federal, State, and local laws, rules, and regulations regarding the proper disposal of this material

Section VIII: Control Measures/ PPE Requirements

Engineering Controls:	Minimize dust generation and accumulation. Avoid breathing dust. Keep exposure below the exposure limits listed in Section III.
Personal Protective Equipment:	<p>Eye Protection: Corrosive to eyes. Wear protective safety goggles when dust generation is likely.</p> <p>Skin Protection: Wear clothing sufficient to cover the skin, safety shoes, and leather gloves for hand protection against dry material.</p> <p>Respiratory Protection: Use NIOSH/MSHA approved respiratory protection (air purifying or air supplying) when concentrations are above exposure limit value. A respiratory protection program that meets OSHA 29 CFR part 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant the use of a respirator.</p>
Good Hygienic Practice:	Wash thoroughly after using product. Wash contaminated clothing. Wash hands before eating or drinking.

Section IX: Physical and Chemical Properties

Bulk density:	180-200 lbs/ft ³	Freeze Point:	Solid at STP	% volatile by vol:	0% H ₂ O
Water solubility:	Insoluble	Melting Point:	>3400 °F	Vapor Density:	N/A
pH: (10% aqueous slurry)	N/A	Boiling Point:	N/A	Vapor Pressure:	N/A
Appearance and Odor:	Chrome ore is usually black, but does show some variation from iron-black to brownish black with some brown streaks. Various grades can vary from large pieces down to fine powders. Odorless.				

Section X: Stability/ Reactivity Data

Stability:	Stable under normal conditions of storage.
Conditions to Avoid:	None under normal conditions.
Incompatibility (materials to avoid):	Chrome ore can react at high temperature with molten alkalis and alkali vapors forming water-soluble chromium salts.
Hazardous Decomposition or Byproducts:	None under normal conditions.
Hazardous Polymerization:	Will not occur.

Section XI: Toxicological Properties

<u>Component</u>	<u>CAS</u>	<u>RTECS Toxicity</u>
Chrome Ore	1308-31-2	N/A

Section XII: Ecological Information

Material derived from mineral ores. No data available on any adverse effects of this material on the environment.

Section XIII: Disposal Considerations

RCRA: As manufactured, this product is not a RCRA listed hazardous waste and does not exhibit any characteristics of a hazardous waste, including TCLP.

Disposal Method: This product is generally suitable for landfill disposal. Follow all applicable Federal, State and local laws regarding proper disposal. If this product has been altered or contaminated with other hazardous materials, appropriate waste analysis may be necessary to determine method of disposal.

Section XIV: Transportation Information

USDOT: Not regulated

Section XV: Regulatory

Note: Prince Minerals, Inc.'s chromite ore is mined from the Transvaal Region of South Africa. This ore and the un-reacted ore component of the chromite ore processing residue are exempt from the reporting requirements under Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (EPCRA) and Section 6607 of the Pollution Prevention Act of 1990 (PPA). See 66FR24066 for complete citation.

RCRA:	No
CERCLA:	No
SARA:	No
TSCA:	Not Regulated

Revision: 5/03

Page 1 of 1

Sodium Bichromate

The International Metals & Chemicals Group
METALSAMERICA/PPBTECHNOLOGIES

MATERIAL SAFETY DATA SHEET

NUMBER: 1053

SECTION I

MANUFACTURER'S NAME: Various
(AMERICHEM as Distributor)ADDRESS: One Pitcairn Place
165 Township Line Road
Jenkintown, PA 19046-3531
1-215-517-6000DOT SHIPPING NAME: Toxic solids, inorganic, n.o.
(sodium bichromate), 6.1, UN3288, PGIII, RQ

CAS NUMBER: 10588-01-9

REPORTABLE QUANTITY: 10 lbs/4.54 KG

CHEMICAL NAME AND SYNONYMS:

Sodium Bichromate

TRADE NAME AND SYNONYMS:

Sodium Dichromate Crystal, Chromic Acid, Disodium Sal

CHEMICAL FAMILY/FORMULA: $\text{Cr}_2\text{Na}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$
Inorganic Acid

EMERGENCY TELEPHONE NUMBER:

Chemtrec: 800-424-9300

Outside USA Call: 212-483-7616

SECTION II - HAZARDOUS INGREDIENTS

Section 313 Supplier Notification This product contains 32% Chromium and is subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40 CFR 372. This information must be included in all Material Safety Data Sheets that are copied and distributed for this material. No other hazardous material is present in concentration greater than 1%.

SECTION III - PHYSICAL DATA

BOILING POINT:	400°C Decomposes	MELTING POINT:	356°
SPECIFIC GRAVITY ($\text{H}_2\text{O} = 1$)	2.34	VOLATILITY/VOL (%):	N/A
SOLUBILITY IN WATER:	at 20°C 73.0%	VAPOR PRESSURE (mm Hg.):	N/A
VAPOR DENSITY (AIR = 1)	N/A	EVAPORATION RATE (____) = 1:	N/A
DENSITY (g/cc):	N/A	FORMULA WEIGHT:	
APPEARANCE AND ODOR: Orange-red crystal, no odor			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT (METHOD USED): Not flammable

FLAMMABLE LIMITS: N/A

EXTINGUISHING MEDIA: Water spray, fog or regular foam, dry chemical.

SPECIAL FIRE FIGHTING PROCEDURES: Material is a strong oxidizer especially in presence of sulfuric acid. May ignite saw dust by prolonged contact. It will lower ignition points of combustible materials. Keep unnecessary people. Isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering. Do not touch or walk through spilled material. Wear self contained breathing apparatus. Chemical protective clothing which is specifically recommended by the shipper or manufacturer may be worn. It may provide little or no thermal protection. Structural firefighters' protective clothing is NOT effective for this material. UNUSUAL FIRE AND EXPLOSION HAZARDS: Under extreme heat, it will decompose to Cr and O_2 (gas). The latter will support combustion. Move container from the fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal. Do not scatter the material. Remove and isolate contaminated clothing at the site.

WFA Ratings: Health(3); Flammability(1); Instability(2); Special Hazard (OX)

Revision: 5/03

Page 2 of 2
Sodium Bichromate

THRESHOLD LIMIT VALUE: OSHA PEL - TWA 1.0 mg(CrO₃)/m³, ACGIH TLV - TWA 0.05 (Cr)/m³ NIOSH REL - TWA 0.1 mg[C(VI)]/m³. **EFFECTS OF OVEREXPOSURE:** Dry or wet material is corrosive to eye and skin tissue. Contact of very small quantities of dust or mist with the eyes can quickly result in severe burns. Inhalation of dust or mist can cause damage to the mucous membranes, perforation of nasal septum, and irritation of the respiratory system. Skin contact can cause severe burns, external ulceration and ulceration of broken skin, "chrome sores." Can be absorbed through the skin and cause systemic poisoning. Ingestion can cause burns to the digestive tract and swallowing of even a small quantity can be fatal due to burns as well as systemic effects. **CHRONIC EFFECTS:** May alter genetic material, damage to the liver, and damage to kidneys. **TARGET ORGAN DATA:** Lungs, thorax respiration (tumors) Tumorigenic (Carcinogenic by RTECS Criteria) Only selected registry of toxic effects of chemical substance (RTECS) data is presented here. **EMERGENCY AND FIRST AID PROCEDURES:** **EYES:** Flush eyes with water holding eyelids open for 15 minutes. **SKIN:** Remove contaminated clothing. Speed in removing contaminated clothing is of extreme importance. Flush skin with soap and water. **INHALATION:** Remove to fresh air. **INGESTION: DO NOT INDUCE VOMITING.** Do not give anything by mouth to unconscious person. Drink plenty of milk or water. If vomiting occurs spontaneously, keep airway clear and give more water. Effects of exposure to this product may be delayed. Keep victim under observation. **SEEK MEDICAL ATTENTION IN THE EVENT OF ANY ACCIDENTAL EXPOSURE TO THIS PRODUCT.** **IMMEDIATE ADMINISTRATION OF 1 GRAM ASCORBIC ACID** (effervescent form) by mouth is recommended. **CARCINOGENICITY INFORMATION:** IARC WARNING: Hexavalent Chromium Compounds are suspected carcinogens. This product is TSCA listed.

SECTION VI - REACTIVITY DATA

STABILITY: Stable **INCOMPATIBILITY (MATERIALS TO AVOID):** This product is a strong oxidizing agent. It may react with easily oxidizable/combustible materials especially at elevated temperatures. Both in dry form and in solution this material may violently react with organic materials such as grease and oil especially in a confined space.

HAZARDOUS DECOMPOSITION PRODUCTS: When heated to decomposition it emits toxic fumes of Na₂O. **HAZARDOUS POLYMERIZATION:** Will not occur. **CONDITIONS TO AVOID:** Avoid storage with incompatible materials and excessive heat.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Solids may be shoveled into drums for reuse or disposal. Spilled liquid material should be contained, absorbed with an inert absorbent such as vermiculite, sand or soil and then shoveled or swept into a closed metal container for disposal. All visible spilled material must be removed as outlined above. **WASTE DISPOSAL METHOD:** Sodium Bichromate must not be discharged into sewers or navigable waters or allowed to contaminate underground water sources. Waste should be reclaimed, if possible. If reclamation is not possible contact local waste disposal contractor or perform the following: (1) Carefully and slowly dissolve in plenty of water. Handle solution carefully - can cause severe burns. (2) Reduce trivalent chromium by mixing with reducing agents such as ferrous sulfate. (3) Adjust pH to 8.5 with sodium carbonate to precipitate the trivalent chromium as chromium hydroxide. (4) Filter and dry the precipitated chromium hydroxide and dispose of by burying in an approved, secured hazardous waste landfill, or contact local waste disposal contractor for disposal.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE): Positive pressure self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT:

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in dry area. When handling, wear rubber gloves, boots and apron, goggles, long-sleeved shirts and hard hat. Respiratory protection where exposure may be above OSHA permissible exposure limit. Keep container closed when not in use. Store away from flammable or combustible materials. **OTHER PRECAUTIONS:** All containers should be kept tightly sealed to avoid moisture pickup. Do not recycle or reuse container. Dispose of empty container in accordance with local, state and federal regulations. Since the actual use by others is beyond the control of The International Metal & Chemicals Group, users must take precautions to ensure that the environmental controls are adequate to maintain the permissible exposure limits applicable.

The information provided in this Material Safety Data Sheet is believed to be accurate and was obtained from sources believed to be reliable. However, the information is provided without any representation or warranty, expressed or implied, with respect to its accuracy or completeness. It is the users' responsibility to determine the suitability of this product and relevance of this information for their use. We do not assume liability resulting from the use, handling, storage, and disposal of this product.

Lead Frit



2741 Kimball Avenue
Pomona, California 91767
(909) 621-4421

MATERIAL SAFETY DATA SHEET

Issue Date:	12/04/2012	Product Code Name:	FM-403 FRITT <i>unground</i>
Product Name:	CERAMIC FRIT - <i>Lead</i>	Chemical Name & Synonyms	
Chemical Family		Trade and Synonyms	LEADED CERAMIC FRIT
Chemical Formula	VARIABLE		

I HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENT	CAS No.	TLV* - TWA**	% BY WEIGHT
INORGANIC LEAD OXIDE		0.05 mg/m3 as PbO OSHA	

Threshold Limit Value TWA ** Time Weighted Average

II PHYSICAL DATA

Material is (At normal conditions) <input type="checkbox"/> Liquid <input checked="" type="checkbox"/> Solid <input type="checkbox"/> Gas		Appearance and Odor CLEAR GLUE	
Acidity/Alkalinity pH = N/A	Melting Point N/E °F Boiling Point N/A °F	Specific Gravity N/E Solubility(Water) N/E	Vapor Pressure N/A

III PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection CONVENTIONAL RESPIRATORY PROTECTION	Hands, Arms and Body NOR NORMALLY REQUIRED
Eyes and Face PROTECTION IN DUSTY SITUATIONS	Other Clothing and Equipment LOCAL EXHAUST VENTILATION TO MINIMIZE DUST EXPOSURE

IV TOXICITY DATA

Inhalation	AVOID INHALATION OF DUST
Ingestion	MAY ALLOW METALS WITHIN THE FRIT TO BE LEACHED WHILE IN THE DIGESTIVE TRACK
Skin Contact	NEGLECTIBLE RISK
Eye Contact	LOW RISK, ONLY MECHANICAL INJURY
hairs	

N/E = NOT ESTABLISHED N/A = NOT APPLICABLE

4/25/13
Rec'd

V SAFETY INFORMATION

FIRE AND EXPLOSION DATA		
Flash Point N/A °F [X] Not Flammable	Autoignition Temperature N/A °F	Flammable Limits in air Lower N/A % Upper N/A %
Unusual and Explosion Hazard NONE	Extinguish Media NO FIRE HAZARD	
REACTIVITY		
Stability [X] Stable [] Unstable	Incompability (Materials to Avoid) N/E	
Conditions to Avoid		
Hazardous Decomposition Products		

VI EMERGENCY AND FIRST AID PROCEDURES

INHALATION:	REMOVE PERSON TO FRESH AIR
SKIN CONTACT	WASH WITH SOAP AND WATER
EYES:	FLUSH WITH RUNNING WATER

VII ENVIROMENTAL

Spill or Leak Procedures HANDLE AS NORMAL SOLID WASTE SCOOP UP WASTE AND PLACE IN APPROPRIATELY MARKED CONTAINERS
Waste Disposal Method WASTE MATERIAL MAY BE DISPOSED OF UNDER CONDITIONS WICH MEET FEDERAL, STATE AND LOCAL ENVIROMENTAL CONTROL REGULATIONS

VIII ADDITIONAL INFORMATION

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The information in this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any representation or warranty, expreset or implied, regarding the accuracy or correctness.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or any way connected with the handling, storage, use or disposal of the product.



2741 Kimball Avenue
Pomona, California 91767
(909) 621-4421

MATERIAL SAFETY DATA SHEET

Issue Date: 12/04/2012

Product Name:

CERAMIC FRIT

Product Code Name:

FM-403 FRITT

unground

0
1
2
3
4

risk minimo
light risk
moderate
serious
severe

Health

2

Reactive

0

0

Explosion

0

Corrosion

0

CAUTION : in can be harmful if it is inhaled by a prolonged and it could cause
dange later to the res'piratory system

avad breathig in highly polvosas areas without the due protection

N/E = NOT ESTABLISHED

N/A = NOT APPLICABLE

To: Holsman, Marianne[Holsman.Marianne@epa.gov]
From: McClintock, Katie
Sent: Wed 3/2/2016 5:21:15 PM
Subject: cassandra's questions
Notes in response to cassandra's questions.docx

Because she is asking good technical questions I decided I'd feel better if I transmitted those answers to you. I don't think these answers are anything concerning to share, and could help improve the public understanding. I would certainly want Dave Bray to look at these and probably Kris Leefers before we would send anything out.

ENFORCEMENT CONFIDENTIAL – PRE DECISIONAL

Katie McClintock

Air Enforcement Officer

EPA Region 10

1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov

To: Holsman, Marianne[Holsman.Marianne@epa.gov]
From: McClintock, Katie
Sent: Tue 3/1/2016 10:16:22 PM
Subject: FW: From Oregon Public Broadcasting

Here is Cassandra's Request.

From: Cassandra Profita [mailto:cprofita@opb.org]
Sent: Tuesday, March 01, 2016 2:14 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: From Oregon Public Broadcasting

Hi Katie,

Thank you for considering my questions. I'd really appreciate your help.

1. After your inspection of Bullseye Glass in Portland, did you find the Part 63 SSSSSS rule should apply to Bullseye? Are its furnaces operating continuously or not? Did you find Bullseye has been wrongly exempted from some Clean Air Act regulations for glassmakers?
2. How confident are you that Bullseye is in compliance with CFR 61 subpart N? What indications do you have that the company might not be in compliance?
3. Have you inspected Uroboros Glass in Portland?
4. Have you inspected Spectrum Glass Woodinville?
5. If so, what did you find in those inspections with regard to how they handle metals and how much hazardous air pollution they are emitting? Are both companies in compliance with air quality rules? Do you agree that Uroboros doesn't need any permit from Oregon DEQ and/or EPA? Is Spectrum following all the Clean Air Act rules that apply to its facility? Did you find pollution controls at Spectrum Glass that you didn't find at Bullseye Glass and Uroboros in Portland?

Let me know how you'd like to proceed.

--

Cassandra Profita

Environment Reporter

Oregon Public Broadcasting

(503)293-1936

Website: earthfix.opb.org

Twitter: @cprofita_opb

To: McClintock, Katie[McClintock.Katie@epa.gov]
Cc: Holsman, Marianne[Holsman.Marianne@epa.gov]
From: Davis, Matthew
Sent: Fri 2/26/2016 7:58:48 PM
Subject: RE: List of facilities in electronic format?

Sorry to bother you again on this. I appreciate your sending the link and memo, but I did see and retrieve the memo itself on the SharePoint. I am interested in just the list of facilities, in a .doc or .xls format, so for my own tracking purposes I can add in the relevant congressional delegations.

-Matthew

From: McClintock, Katie
Sent: Friday, February 26, 2016 2:55 PM
To: Davis, Matthew <Davis.Matthew@epa.gov>
Cc: Holsman, Marianne <Holsman.Marianne@epa.gov>
Subject: RE: List of facilities in electronic format?

https://usepa-my.sharepoint.com/personal/mcclintock_katie_epa_gov/_layouts/15/guestaccess.aspx?guestaccesstoken=urFMq

I think that should work. It is on the main page, not in a folder: here is that link is well:

https://usepa-my.sharepoint.com/personal/mcclintock_katie_epa_gov/Documents/Colored%20Glass

If all else fails, I'll attach it.

From: Davis, Matthew

Sent: Friday, February 26, 2016 11:08 AM

To: McClintock, Katie <McClintock.Katie@epa.gov>; Holsman, Marianne
<Holsman.Marianne@epa.gov>

Subject: List of facilities in electronic format?

Katie, Marianne,

Hope your Friday is going well! I'm wondering if you could send along and/or post the SharePoint/OneDrive the list of facilities that was appended to Janet McCabe's memo. I couldn't find it up on the OneDrive, though it is possible it is there and I just wasn't looking in the right folder or something (sorry!). If you do have it, please send it along as it would be helpful for me for this potential roll-out with the memo and letter that just went over to the Gov. Brown.

Thanks,

Matthew

Matthew H. Davis

Air Team, Office of Congressional Affairs

Office of Congressional and Intergovernmental Relations

Office of the Administrator, U.S. EPA

1200 Pennsylvania Ave NW, MC 1301A

Washington, DC 20460

(202) 564-1267

To: Davis, Matthew[Davis.Matthew@epa.gov]
Cc: Holsman, Marianne[Holsman.Marianne@epa.gov]
From: McClintock, Katie
Sent: Fri 2/26/2016 7:55:04 PM
Subject: RE: List of facilities in electronic format?
Memo from Janet McCabe on Art Glass Manf emissions feb25.pdf

https://usepa-my.sharepoint.com/personal/mcclintock_katie_epa_gov/_layouts/15/guestaccess.aspx?guestaccesstoken=urFMq

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To: McClintock, Katie <McClintock.Katie@epa.gov>; Holsman, Marianne <Holsman.Marianne@epa.gov>
Subject: List of facilities in electronic format?

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Matthew

Matthew H. Davis

Air Team, Office of Congressional Affairs

Office of Congressional and Intergovernmental Relations

Office of the Administrator, U.S. EPA

1200 Pennsylvania Ave NW, MC 1301A

Washington, DC 20460

(202) 564-1267

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Holsman, Marianne
Sent: Fri 2/12/2016 6:02:24 PM
Subject: Fw: OPB - Colored Glass

From: Davis, Alison
Sent: Thursday, February 11, 2016 1:40 PM
To: Holsman, Marianne
Subject: OPB - Colored Glass

Hi Marianne,

I'm picking up this inquiry. I have your message to Mike about including the Oregon toxics monitoring info, and we'll look for a way to do that. It's a good point.

We are working this request through Enesta, which is our preference for all OAQPS press questions. The list of questions Cassandra sent her was much longer than she had shared with you. Thought you might like to see them (pasted below). Her deadline is tomorrow; we're working on answers.

- What pollution regulations apply to colored glass-making facilities?
- How much of what kinds of pollutants are colored glass-makers allowed to emit?
- What kind of pollution controls are required for colored glass-makers?
- Are there other pollution controls these glass-makers could use to control emissions from their furnaces?
- Are all colored glass facilities subject to pollution regulations?
- Are there some colored glass-makers that don't have to add any pollution controls at all?
- Do colored-glass facility regulations vary from state to state? How many of these facilities are there in the U.S.?
- How do you test to see if the required pollution controls are working?
- How do regulators know if the pollution from these facilities goes beyond the emissions standards?
- The findings of elevated cadmium and arsenic in the air near Bullseye Glass in Portland suggest the existing regulations are allowing more emissions of these metals in the air than regulators knew about. Has that situation revealed a problem? Is there a loophole in the regulations that needs to be closed?
- Do our current regulations allow unhealthy amounts of cadmium and arsenic emissions to be released from colored glass-making facilities? Did the EPA already know that? Or did the moss testing in Portland reveal that fact?
- Is anyone at the EPA working to change the way colored glass-making facilities are regulated?

Thanks.

-Alison

Alison Davis

Senior Advisor for Public Affairs

US EPA, Office of Air Quality Planning & Standards

Research Triangle Park, NC 27711

Desk: 919-541-7587

Mobile: 919-624-0872



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 25 2016

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Art Glass Manufacturing - Request for Regional Input

FROM: Janet G. McCabe *JGM*
Acting Assistant Administrator

TO: Regional Air Division Directors
Regions 1-10

I am writing to make you aware of an air toxics situation that has been taking place in Region 10 and ask your assistance as we work to understand the national implications of this situation. In this memo, I am summarizing the situational background and the ways in which EPA is supporting Oregon to respond. I hope you were able to attend yesterday's special purpose call and have a better understanding of the situation on the ground in Portland. My specific asks of you moving forward are to, by March 9, 2016:

1. Provide any information you currently have about the sources we've identified (attached), and if you are aware of any additional art (or colored) glass manufacturing facilities not on this list.
2. Communicate with your states to:
 - a. ensure they are aware of the issues associated with these sources in Oregon;
 - b. offer your assistance in determining whether there are similar emissions of concern associated with these sources; and
 - c. request your states provide any information they have about these sources.
3. Let me know if your Region has special expertise in this type of facility or control of these types of pollutants.

Background

The U.S. Forest Service (USFS), in a pilot study, found moss collected from trees around art glass manufacturers in the Portland area—and Bullseye Glass in particular—had much higher concentrations of heavy metals than other areas in the city. This result prompted the Oregon Department of Environmental Quality (ODEQ) to set up air monitoring systems near the company to collect 24-hour air samples every few days over a 30-day period in October 2015.

In early February, ODEQ made publicly available the results of that air monitoring, which showed high levels of cadmium and arsenic in the air and began investigating potential sources. Preliminary work suggests that the metals found in the monitoring were coming in large part from Bullseye Glass, an art glass manufacturing facility. Elevated cadmium levels were also found in proximity to another Portland glass manufacturer, Uroboros Glass. Both companies have suspended the use of chromium and

cadmium; Bullseye, which also used arsenic, has suspended its use. ODEQ has provided a summary at <http://www.deq.state.or.us/nwr/docs/metalsem/FSDEQAdressingAirToxics.pdf>, and they are providing regular updates and technical information on the Portland Metals website at <http://www.deq.state.or.us/nwr/metalsemissions.htm>.

OAQPS has identified 14 other similar facilities, which, like Bullseye and Uroboros, may manufacture art glass and may use raw metals in their processes. A Clean Air Act National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR Part 63, Subpart SSSSSS) for glass manufacturing area sources has been in effect since 2007. This rule applies to continuous furnaces that produce 50 tons or more of glass per year using any amount of toxic metals in the glass recipe. As noted below, one area of investigation is the applicability of Part 63, Subpart SSSSSS to these and similar facilities.

EPA Assistance

The EPA has been fully engaged to support Oregon and others as this situation has developed, including supporting efforts to identify all art glass producers that might have similar issues and all other sources of metals emissions in Oregon.

In Region 10:

- Staff and management are working closely with state partners to provide significant assistance to ODEQ and the Oregon Health Authority (OHA). Oregon has set up an incident command structure for managing this issue, and the Region 10 Operations Office in Portland is part of the team, helping to coordinate EPA's assistance as a part of the state's ongoing work.
- EPA Region 10's focus has been on supporting Oregon to work directly with impacted facilities and to provide assistance in the development of air and soil sampling programs. Two weeks ago, EPA Region 10 enforcement staff, including an expert on glass manufacturing facilities, conducted a joint inspection with ODEQ of the Bullseye Glass Company and an EPA inspection of Uroboros Glass. The EPA subsequently inspected Spectrum Glass in Washington State and conducted a joint inspection with ODEQ of Northstar Glassworks in Portland. The EPA's engineers and technical specialists from across the country¹ have participated in subsequent technical meetings with ODEQ and Bullseye Glass to provide guidance on analytical methods to characterize the sources and information on technologies available to control emissions from glass manufacturing facilities. We have supported Oregon in their actions to secure agreements from the companies to stop using the compounds that are associated with the toxic emissions found in the air monitoring until other solutions can be developed. ODEQ and OHA have been very proactive in their efforts to identify risks to the public from air toxics and in response to this specific situation.
- For the assessment of impacts, EPA Region 10 has loaned air monitoring equipment and provided supplies to ODEQ for collection of air samples to analyze for heavy metals. The EPA has also loaned ODEQ equipment to analyze soil samples and offered access to one of the EPA's science and technical assistance contractors. The EPA air and cleanup staff have offered assistance in the development of air and soil sampling programs. In addition, the EPA risk assessors stand ready to

¹ Region 10 added experts to our team from Region 7, which has worked extensively with the development of the Wool Fiberglass Rule to determine and address hexavalent chromium emissions in EJ neighborhoods. Also, OAQPS' Measurement Technology Group is providing guidance and information on hexavalent chromium emissions measurement methods. The National Risk Management Laboratory has provided background materials on chromium reactions at high temperatures.

work with the OHA, Multnomah County Health Department, and the Agency for Toxics Substances and Disease Registry to help assess and communicate the public health risks using the limited data currently available and to refine the assessment as more information becomes available on concentrations of metals in the air and soil.

At Headquarters:

- Relevant experts from the Office of Air Quality Planning and Standards (OAQPS) and the Office of Research and Development (ORD) are providing technical support to Region 10 on source testing, health impacts of air toxics levels and other monitoring and impacts issues as they arise.
- The Office of Enforcement and Compliance Assistance (OECA), the Office of General Counsel (OGC) and OAQPS are jointly investigating the applicability of Part 63, Subpart SSSSSS to these and similar facilities nationally.
- OECA and Region 10 have also discussed potential use of authority under Clean Air Act Section 114 to request additional information from facilities nationwide.
- OAQPS is working to improve our characterizations of emissions from art glass manufacturing facilities.
- OAQPS and ORD are collaborating to assess the viability of the original USFS study as a screening methodology for air toxics and review screening modeling by state of Washington. This will help determine whether this modeling can be applied to other art glass manufacturing facilities.
- OAQPS is also considering the feasibility of using the Community Scale Air Toxics Ambient Monitoring funds (FY16) to reimburse the ODEQ for Portland monitoring and conduct new monitoring around other plants.

We will keep you posted on these activities and look forward to receiving additional information from you as requested above. If you or your states have questions, please contact Mike Koerber in OAQPS.

Attachment

Company Name	Street Address	Region	City	State	Zip	Phone	Notes
1 Steuben	One Museum Way	2	Corning	NY	14830	607 937-5371	fabricator?
2 Blenko Glass	9 Bill Blenko Dr.	3	Milton	WV	25541	304 743-9081	
3 Youghiogheny Glass	300 S 1st Street	3	Connellsville	PA	15425	724 628-3000	
4 Wissmach Glass	420 Stephen St.	3	Paden City	WV	26159	304 337-2253	
5 Fenton Glass	700 Elizabeth St	3	Williamstown	WV	26187	304 375-6122	closed but permitted
6 Armstrong Glass	55 Chastain Road NW	4	Kennesaw	GA	30144	770 919-9924	
7 Origin Glass (Elan Technologies)	169 Elan Court	4	Midway	GA	31320	912 880-3526	
8 Parramore Glass	PO BOX 2777	4	Asheville	NC	28802	828 456-4414	
9 Franklin glass	222 East Sycamore St	5	Columbus	OH	43206	614 221-2972	
10 Kokomo Glass	1310 S. Market St.	5	Kokomo	IN	46902	765 457-8136	
11 Pacific Art Glass	125 West 157th St	9	Gardena	CA	90248	310 780-4047	fabricator?
12 Uroboros Glass	2139 N. Kerby Ave. SE	10	Portland	OR	97227	503 284-4900	
13 Spectrum Glass	21415 87th Avenue SE	10	Woodinville	WA	98072	425 483-6699	
14 Bullseye glass	3722 SE 21st Ave	10	Portland	OR	97202	503 232-8887	
15 System 96	24105 Snohomish-Woodinville Road	10	Woodinville	WA	98072	425 483-6699	fabricator?
16 Northstar Glassworks	8228 SE 26th Place	10	Portland	OR	97202	866 684-6986	makes colored borosilicate glass
17 Trautman Art glass		10	Portland	OR			
18 Glass Alchemy		10	Portland	OR			
19 Momka's Glass	19580 23rd Avenue NE	10	Arlington	WA	98223	425 776-3417	

To: Smith, Judy[Smith.Judy@epa.gov]; McClintock, Katie[McClintock.Katie@epa.gov]
Cc: Leefers, Kristin[Leefers.Kristin@epa.gov]; Holsman, Marianne[Holsman.Marianne@epa.gov]
From: Chow, Alice
Sent: Wed 3/2/2016 8:31:22 PM
Subject: RE: Question

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Associate Director

Office of Air Monitoring and Analysis

U.S. EPA, Region III

1650 Arch Street

Philadelphia, PA 19103

Phone: 215-814-2144

Email: chow.alice@epa.gov

From: Smith, Judy

Sent: Wednesday, March 02, 2016 2:35 PM

To: McClintock, Katie <McClintock.Katie@epa.gov>; Chow, Alice <chow.alice@epa.gov>

Cc: Leefers, Kristin <Leefers.Kristin@epa.gov>; Holsman, Marianne
<Holsman.Marianne@epa.gov>

Subject: Re: Question

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Judy or Marianne do you have any thoughts?

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To: McClintock, Katie[McClintock.Katie@epa.gov]
Cc: Kowalski, Ed[Kowalski.Edward@epa.gov]; Holsman, Marianne[Holsman.Marianne@epa.gov]
From: McLerran, Dennis
Sent: Wed 2/17/2016 6:09:23 AM
Subject: Re: Tubman Middle School is next to Uroboros

Thanks Katie. Very helpful.

Dennis

Sent from my EPA iPhone

On Feb 16, 2016, at 9:29 PM, McClintock, Katie <McClintock.Katie@epa.gov> wrote:

Tubman middle school is a stones throw (500 ft about) from Urobors as you can see on the map below. That is also the school where the public meeting is being held. This map also shows other nearby schools. There are schools across the river as well. I don't know about upwind/downwind information.

<image002.png>

Katie McClintock

Air Enforcement Officer

EPA Region 10

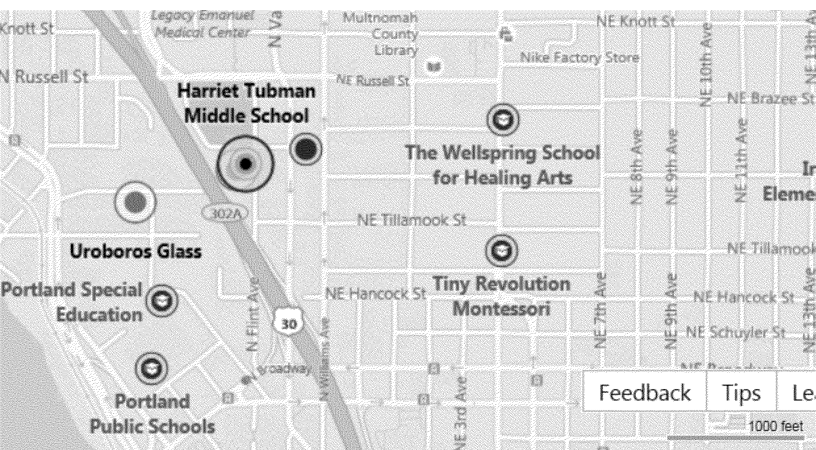
1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov



ED_000719_00026367

EPA_000277

To: Chow, Alice[chow.alice@epa.gov]; Smith, Judy[Smith.Judy@epa.gov]; McClintock, Katie[McClintock.Katie@epa.gov]
Cc: Leefers, Kristin[Leefers.Kristin@epa.gov]
From: Holsman, Marianne
Sent: Wed 3/2/2016 10:13:00 PM
Subject: RE: Question

All, this was the reactive statement developed on Friday for the Janet memo for use if we received press calls.

An updated statement is being worked on now.

Marianne

Follow us!



From: Chow, Alice
Sent: Wednesday, March 02, 2016 12:31 PM
To: Smith, Judy <Smith.Judy@epa.gov>; McClintock, Katie <McClintock.Katie@epa.gov>
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Cc: Leefers, Kristin[Leefers.Kristin@epa.gov]
From: Holsman, Marianne
Sent: Wed 3/2/2016 8:51:28 PM
Subject: RE: Question

Hi Alice and all:

We'll keep you posted (or HQ will) when this statement is final. I think it's still being reviewed.

Thanks.

Marianne

Follow us!



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Email: chow.alice@epa.gov

To: DAVIS George[George.DAVIS@state.or.us]; PEDERSEN Dick[Dick.PEDERSEN@state.or.us]; GOLDFARB Gabriela * GOV (Gabriela.GOLDFARB@oregon.gov)[Gabriela.GOLDFARB@oregon.gov]; MONRO David[David.MONRO@state.or.us]; DAVIS George[George.DAVIS@state.or.us]; Narvaez, Madonna[Narvaez.Madonna@epa.gov]; Doolan, Stephanie[Doolan.Stephanie@epa.gov]; McClintock, Katie[McClintock.Katie@epa.gov]; McCullough, Hugh[McCullough.Hugh@epa.gov]; Johnson, Steffan[johnson.steffan@epa.gov]; ARMITAGE Sarah[Sarah.ARMITAGE@state.or.us]
Cc: DAVIS George[George.DAVIS@state.or.us]; FLYNT Jennifer[Jennifer.FLYNT@state.or.us]; FELDON Leah[Leah.FELDON@state.or.us]; DECONCINI Nina[Nina.DECONCINI@state.or.us]
From: Garrahan Paul
Sent: Thur 2/18/2016 9:23:27 PM
Subject: RE: Friday Bullseye glass meeting and pre-meeting

Regarding Bullseye's reaction to EPA's participation, I have already told their attorney that we were hoping to have some EPA technical experts join us by telephone and he raised no objections to that.

Paul Garrahan

Oregon Department of Justice

971.673.1943 (Tue, Thu, Fri) (Portland)

503.947.4593 (Mon, Wed) (Salem)

503.929.7553 (Mobile)

From: DAVIS George [mailto:george.davis@state.or.us]
Sent: Thursday, February 18, 2016 1:14 PM
To: PEDERSEN Dick; GOLDFARB Gabriela * GOV (Gabriela.GOLDFARB@oregon.gov); MONRO David; DAVIS George; Narvaez, Madonna; Doolan, Stephanie; McClintock, Katie; McCullough, Hugh; Johnson, Steffan; ARMITAGE Sarah
Cc: DAVIS George; FLYNT Jennifer; FELDON Leah; DECONCINI Nina; GARRAHANPaul
Subject: Friday Bullseye glass meeting and pre-meeting

Hello everyone,

In anticipation of the Friday afternoon meeting between Bullseye Glass and their attorneys Perkins Coie (Bullseye/PC), and DEQ, DOJ and the Governor's Office staff, DEQ has scheduled a pre-meeting Friday morning to discuss the Bullseye/PC meeting. We apologize for the late notice, we know many of you have full schedules and won't be able to make it, but we ask that those who can please do so. We don't have an agenda yet, but hope to have something by the

time the pre-meeting begins. The main purpose of this email is to get this on your calendars.

Pre-meeting date, time and location: Friday, 2/19, 10:00 am – 12:00 am (hopefully shorter than that) DEQ NWR office (700 NE Multnomah, 6th floor), room 601

We do not have a call-in number set up yet, we'll try to get that done before the pre-meeting and will forward the number to everyone in the morning.

Meeting date, time and location: Friday, 2/19, 2:00 pm – 4:00 pm, Perkins Coie office, 1120 NW Couch St., Portland, 10th floor

We do not have call-in information yet, but understand a call-in line will be set up. Again, we'll forward that information when we get it.

Important odds and ends:

The meeting with Bullseye/PC appears to involve discussion of both technical and non-technical topics. DEQ regards EPA's participation for the technical discussion as critical; however, we don't know how Bullseye/PC will feel about EPA's participation. If they object, we will have to figure out what to do on the fly.

Sarah, we hope you can attend the pre-meeting, and hope you will be able to call in for the afternoon Bullseye/PC meeting.

Possible/probable topics at the Bullseye/PC meeting:

Bullseye/PC requested the following from DEQ:

- To explain how the emissions data links Bullseye as the source of the emissions; and
- To provide the backup laboratory data that supports the air emissions sampling

results that have been provided to them.

Suggested goals for the meeting from DEQ side:

- Listen and continue to build a cooperative, effective relationship;
- Provide the information we can to support our concerns about the health impacts of air emissions from Bullseye;
- Secure a longer commitment not to use any chromium, assuming we are not able to resolve the conversion, until we are able to reach a confident conclusion about risks;
- Confirm ongoing commitment not to use cadmium or arsenic;
- Start discussion about whether control technology option exists to control cadmium and arsenic emissions (and chromium, if necessary), or figure out a timeline and next steps toward resolving that question, and a discussion of technical and other state assistance that may be available to that end; and
- If we start to get a sense of a timeline and length of commitments Bullseye and we are making, start talking about documenting our commitments in writing, including a method to monitor to be able to provide public assurances that such agreement is being complied with.

Again, our apologies for the late notice and scant information, we hope to get things better sorted as the time gets closer.

George Davis

DEQ

503-229-5534

*****CONFIDENTIALITY NOTICE*****

This e-mail may contain information that is privileged, confidential, or otherwise exempt from disclosure under applicable law. If you are not the addressee or it appears from the context or otherwise that you have received this e-mail in error, please advise me immediately by reply e-mail, keep the contents confidential, and immediately delete the message and any attachments from your system.

To: PEDERSEN Dick[Dick.PEDERSEN@state.or.us]; GOLDFARB Gabriela * GOV (Gabriela.GOLDFARB@oregon.gov)[Gabriela.GOLDFARB@oregon.gov]; MONRO David[David.MONRO@state.or.us]; DAVIS George[George.DAVIS@state.or.us]; Narvaez, Madonna[Narvaez.Madonna@epa.gov]; Doolan, Stephanie[Doolan.Stephanie@epa.gov]; McClintock, Katie[McClintock.Katie@epa.gov]; McCullough, Hugh[McCullough.Hugh@epa.gov]; Johnson, Steffan[johnson.steffan@epa.gov]; ARMITAGE Sarah[sarah.armitage@state.or.us]
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Subject: Friday Bullseye glass meeting and pre-meeting

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- Secure a longer commitment not to use any chromium, assuming we are not able to resolve the conversion, until we are able to reach a confident conclusion about risks;
- Confirm ongoing commitment not to use cadmium or arsenic;
- Start discussion about whether control technology option exists to control cadmium and arsenic emissions (and chromium, if necessary), or figure out a timeline and next steps toward resolving that question, and a discussion of technical and other state assistance that may be available to that end; and
- If we start to get a sense of a timeline and length of commitments Bullseye and we are making, start talking about documenting our commitments in writing, including a method to monitor to be able to provide public assurances that such agreement is being complied with.

Again, our apologies for the late notice and scant information, we hope to get things better sorted as the time gets closer.

George Davis

DEQ

503-229-5534

Pre-meeting agenda/discussion doc

General structure of the call: Non-technical discussions first, technical discussions (if any) after.

1. We expect Bullseye to:
 - a. Argue they are not the major or only source of metals;
 - b. Argue in favor of restarting production of chromium-containing glass;
 - c. Present technical information supporting their argument; and
 - d. MIGHT ask: Under what circumstances will DEQ agree to allow use of chromium (or any other metal of concern)?
2. Meeting could involve 4 different discussion topics:
 - a. Legal – Limits of DEQ’s authority, right to operate
 - b. Technical – DEQ’s basis for declaring Bullseye the most likely source of the metals emissions
 - c. Technical – Information regarding hexavalent chromium emissions (or lack of emissions)
 - d. Technical/legal – Under what circumstances will DEQ agree to allow use of chromium (or any other metal of concern)? May involve:
 - i. Technical constraints on operation; and
 - ii. Legal mechanism (Mutual Agreement and Order)
3. Identify discussion leads
 - a. Legal – Limits of DEQ’s authority, right to operate
Dick Pedersen, Paul Garrahan/Gary Vrooman, _____
 - b. Technical – DEQ’s basis for declaring Bullseye the most likely source of the metals emissions
Sarah Armitage, David Monroe, _____
 - c. Technical – Information regarding hexavalent chromium emissions (or lack of emissions)
EPA – Steffan Johnson, ????, _____
 - d. Technical/legal – Under what circumstances will DEQ agree to allow use of chromium (or any other metal of concern)?
Dick Pedersen, David Monroe, _____
4. Discuss DEQ’s/state’s/EPA’s overall approach to these discussions
5. Discuss desired outcomes
6. Other items? Fluorides, other metals, other? _____
7. End meeting

To: Koerber, Mike[Koerber.Mike@epa.gov]
From: McClintock, Katie
Sent: Sat 3/5/2016 6:47:59 PM
Subject: Re: Portland glass facilities

Will do. And please send me whatever your folks have as well so we are hopefully not duplicating our efforts. Gina is coming out to visit us Wednesday too so I'm putting together a draft paper for that and will share as well. Do you have a feeling for what she will be most interested in hearing about?

Sent from my iPhone

On Mar 5, 2016, at 10:45 AM, Koerber, Mike <Koerber.Mike@epa.gov> wrote:

Thanks, Katie. Yes, anything you have to share on #1 and 3 would be great. I am expecting an update from my folks early next week. So, it would be good to combine our information with what you have learned.

Mike

Sent from my iPhone

On Mar 5, 2016, at 1:21 AM, McClintock, Katie <McClintock.Katie@epa.gov> wrote:

Mike,

Thanks for sending this my way. Do you need any updates from me on items one and three in the bottom email? I will put a Puget Sound update in my daily update today, but can try to sum up the work on #1. I have been working hard when I can on that one.

From: Koerber, Mike
Sent: Friday, March 04, 2016 10:12 AM
To: Hastings, Janis <Hastings.Janis@epa.gov>; Bray, Dave <Bray.Dave@epa.gov>
Cc: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: FW: Portland glass facilities

As a followup to today's call, here is the summary of the call with USFS.

Mike

From: Shelow, David
Sent: Friday, March 04, 2016 12:29 PM
To: Wayland, Richard <Wayland.Richard@epa.gov>; Fox, Tyler <Fox.Tyler@epa.gov>; Benedict, Kristen <Benedict.Kristen@epa.gov>; Weinstock, Lewis <Weinstock.Lewis@epa.gov>; Koerber, Mike <Koerber.Mike@epa.gov>
Cc: Watkins, Tim <Watkins.Tim@epa.gov>; Johnson, Steffan <johnson.steffan@epa.gov>; Hemby, James <Hemby.James@epa.gov>; Landis, Matthew <Landis.Matthew@epa.gov>
Subject: RE: Portland glass facilities

Here are the notes from our call with the researcher Geoff Donovan.

Dave and Matt.

David M. Shelow
National Air Toxics Ambient Monitoring Program Manager
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Ambient Air Monitoring Group C304-06
Research Triangle Park, NC 27711
Phone: 919-541-3776
Fax:: 919-541-1903
Email: shelow.david@epa.gov

From: Wayland, Richard
Sent: Wednesday, March 02, 2016 3:14 PM
To: Fox, Tyler <Fox.Tyler@epa.gov>; Benedict, Kristen <Benedict.Kristen@epa.gov>; Weinstock, Lewis <Weinstock.Lewis@epa.gov>
Cc: Watkins, Tim <Watkins.Tim@epa.gov>; Shelow, David <Shelow.David@epa.gov>; Johnson, Steffan <johnson.steffan@epa.gov>; Hemby, James <Hemby.James@epa.gov>
Subject: FW: Portland glass facilities

Hi folks,

In the attached memo, Janet outlines several actions being undertaken by EPA in response to the Portland Bullseye Glass air toxics issue. Specifically, there are 3 things that we (AQAD) are responsible for tracking.

1. Improving our characterization of emissions from art glass manufacturing facilities
2. Asses the viability of the original USFS study (Moss monitoring) as a screening methodology for air toxics
3. Review screening modeling by Puget Sound

Mike Koerber has asked for a short paragraph on each of these 3 activities by early next week. On the Moss monitoring, I have not heard from the USFS scientist and am asking Tim Watkins to see if the fellow has contacted him yet. On the other two, can you guys help me pull a paragraph together to get back to Mike? Maybe try for a draft by Friday and we can finalize it next week.

Thanks

Chet

Richard A. "Chet" Wayland | Director | Air Quality Assessment Division - Mail Code C304-02 | Office of Air Quality Planning & Standards | U.S. Environmental Protection Agency | Research Triangle Park, NC 27711 | Desk: 919-541-4603 | Cell: 919-606-0548 | Fax: 919-541-4511 |

To: Koerber, Mike[Koerber.Mike@epa.gov]
From: McClintock, Katie
Sent: Fri 2/26/2016 9:04:31 PM
Subject: RE: Portland glass facilities

Thanks Mike.

From: Koerber, Mike
Sent: Friday, February 26, 2016 12:48 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: RE: Portland glass facilities

Katie - No problem. You've been amazing on this project. Thank you so much!

Mike

From: McClintock, Katie
Sent: Friday, February 26, 2016 3:39 PM
To: Koerber, Mike <Koerber.Mike@epa.gov>
Subject: RE: Portland glass facilities

Thanks, I'm sorry I was looking for an actual other email attachment vs a table at the end. Sorry for taking up more of your time. Have a good weekend!

From: Koerber, Mike
Sent: Friday, February 26, 2016 12:37 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: FW: Portland glass facilities

Katie – Here is the version sent to the Regions. We missed a typo on page 2, which refers to 16

facilities (Bullseye, Uroboros and 14 other similar facilities), but the list has 19. Oh, well.

Mike

From: McCabe, Janet
Sent: Thursday, February 25, 2016 7:09 PM
Subject: Portland glass facilities

Air Division Directors—

Attached is a memo in followup to the special purpose call OAQPS held yesterday about the glass facilities in Portland and beyond. Please contact Mike Koerber if you have any questions.

To: Koerber, Mike[Koerber.Mike@epa.gov]
From: McClintock, Katie
Sent: Fri 2/26/2016 8:38:37 PM
Subject: RE: Portland glass facilities

Thanks, I'm sorry I was looking for an actual other email attachment vs a table at the end. Sorry for taking up more of your time. Have a good weekend!

From: Koerber, Mike
Sent: Friday, February 26, 2016 12:37 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: FW: Portland glass facilities

Katie – Here is the version sent to the Regions. We missed a typo on page 2, which refers to 16 facilities (Bullseye, Uroboros and 14 other similar facilities), but the list has 19. Oh, well.

Mike

From: McCabe, Janet
Sent: Thursday, February 25, 2016 7:09 PM
Subject: Portland glass facilities

Air Division Directors—

Attached is a memo in followup to the special purpose call OAQPS held yesterday about the glass facilities in Portland and beyond. Please contact Mike Koerber if you have any questions.

To: Koerber, Mike[Koerber.Mike@epa.gov]
From: McClintock, Katie
Sent: Thur 2/18/2016 3:09:06 PM
Subject: RE: Daily update - mostly quick summary about Spectrum Glass

Thanks Mike. I will add it. Also, it looks to me (though the map is small) that the natts monitor is over a mile north of uroboros right? I know that OR produced modeling maps with this kind of information but would we expect this site to actually pick up any meaningful concentrations of vaporous metals that far from a source? I noticed in the writeup that we wrote "near" and I'm not sure 1 mile or more is near enough for any registered ambient concentrations.

Katie

From: Koerber, Mike
Sent: Thursday, February 18, 2016 5:41 AM
To: McClintock, Katie <McClintock.Katie@epa.gov>; Downey, Scott <Downey.Scott@epa.gov>; Leefers, Kristin <Leefers.Kristin@epa.gov>; Bray, Dave <Bray.Dave@epa.gov>; Narvaez, Madonna <Narvaez.Madonna@epa.gov>; Fairchild, Susan <Fairchild.Susan@epa.gov>; Holsman, Marianne <Holsman.Marianne@epa.gov>; Hastings, Janis <Hastings.Janis@epa.gov>; Froikin, Sara <Froikin.Sara@epa.gov>; Matthews, Julie <Matthews.Juliane@epa.gov>; Franklin, Richard <Franklin.Richard@epa.gov>; Kowalski, Ed <Kowalski.Edward@epa.gov>; Wroble, Julie <Wroble.Julie@epa.gov>; Hall, Chris <Hall.Christopher@epa.gov>; Moon, Wally <Moon.Wally@epa.gov>; Fried, Gregory <Fried.Gregory@epa.gov>; McLerran, Dennis <mclerran.dennis@epa.gov>; Pirzadeh, Michelle <Pirzadeh.Michelle@epa.gov>; Smith, Judy <Smith.Judy@epa.gov>; Koprowski, Paul <Koprowski.Paul@epa.gov>; Hedgpeth, Zach <Hedgpeth.Zach@epa.gov>; Fleming, Sheila <fleming.sheila@epa.gov>; Field, Chris <Field.Chris@epa.gov>; Martenson, Eric <Martenson.Eric@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Terada, Calvin <Terada.Calvin@epa.gov>; Barnett, Keith <Barnett.Keith@epa.gov>; Kaetzel, Rhonda <Kaetzel.Rhonda@epa.gov>; Wendel, Arthur <Wendel.Arthur@epa.gov>
Subject: RE: Daily update - mostly quick summary about Spectrum Glass

FYI – here is information on cadmium and arsenic concentrations from the NATTS network.

Katie – you may wish to add this to the Sharepoint site

From: McClintock, Katie
Sent: Thursday, February 18, 2016 12:52 AM
To: Downey, Scott <Downey.Scott@epa.gov>; Leefers, Kristin <Leefers.Kristin@epa.gov>;

Bray, Dave <Bray.Dave@epa.gov>; Narvaez, Madonna <Narvaez.Madonna@epa.gov>; Fairchild, Susan <Fairchild.Susan@epa.gov>; Holsman, Marianne <Holsman.Marianne@epa.gov>; Hastings, Janis <Hastings.Janis@epa.gov>; Froikin, Sara <Froikin.Sara@epa.gov>; Matthews, Julie <Matthews.Juliane@epa.gov>; Franklin, Richard <Franklin.Richard@epa.gov>; Kowalski, Ed <Kowalski.Edward@epa.gov>; Wroble, Julie <Wroble.Julie@epa.gov>; Hall, Chris <Hall.Christopher@epa.gov>; Moon, Wally <Moon.Wally@epa.gov>; Fried, Gregory <Fried.Gregory@epa.gov>; McLerran, Dennis <mclerran.dennis@epa.gov>; Pirzadeh, Michelle <Pirzadeh.Michelle@epa.gov>; Smith, Judy <Smith.Judy@epa.gov>; Koprowski, Paul <Koprowski.Paul@epa.gov>; Hedgpeth, Zach <Hedgpeth.Zach@epa.gov>; Fleming, Sheila <fleming.sheila@epa.gov>; Field, Chris <Field.Chris@epa.gov>; Martenson, Eric <Martenson.Eric@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Terada, Calvin <Terada.Calvin@epa.gov>; Barnett, Keith <Barnett.Keith@epa.gov>; Kaetzel, Rhonda <Kaetzel.Rhonda@epa.gov>; Wendel, Arthur <Wendel.Arthur@epa.gov>; Koerber, Mike <Koerber.Mike@epa.gov>

Subject: Daily update - mostly quick summary about Spectrum Glass

Here is the update. It is mostly a quick summary of the inspection at Spectrum. Even quicker summary – they are huge and there is a large potential for emissions from this source, even with their existing controls.

https://usepa-my.sharepoint.com/personal/mcclintock_katie_epa_gov/Documents/Color%20Glass

To: McLerran, Dennis[mclerran.dennis@epa.gov]; Kowalski, Ed[Kowalski.Edward@epa.gov]
From: McClintock, Katie
Sent: Wed 2/17/2016 5:29:12 AM
Subject: Tubman Middle School is next to Uroboros

Tubman middle school is a stones throw (500 ft about) from Urobors as you can see on the map below. That is also the school where the public meeting is being held. This map also shows other nearby schools. There are schools across the river as well. I don't know about upwind/downwind information.



Katie McClintock

Air Enforcement Officer

EPA Region 10

1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Kowalski, Ed
Sent: Sun 3/6/2016 7:29:42 PM
Subject: Re: Color Glass Daily Update 3-4-16

Katie, are you available for a call with ODEQ today (Sunday)?

Sent from my iPhone

On Mar 4, 2016, at 11:04 PM, McClintock, Katie <McClintock.Katie@epa.gov> wrote:

https://usepa-my.sharepoint.com/personal/mcclintock_katie_epa_gov/Documents/Colored%20Glass

Katie McClintock

Air Enforcement Officer

EPA Region 10

1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov

<Daily Update 3-4-16.docx>

<Media Monitoring Report Metal Release 03.04.2016.docx>

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Koerber, Mike
Sent: Fri 2/26/2016 8:48:21 PM
Subject: RE: Portland glass facilities

Katie - No problem. You've been amazing on this project. Thank you so much!

Mike

From: McClintock, Katie
Sent: Friday, February 26, 2016 3:39 PM
To: Koerber, Mike <Koerber.Mike@epa.gov>
Subject: RE: Portland glass facilities

Thanks, I'm sorry I was looking for an actual other email attachment vs a table at the end. Sorry for taking up more of your time. Have a good weekend!

From: Koerber, Mike
Sent: Friday, February 26, 2016 12:37 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: FW: Portland glass facilities

Katie – Here is the version sent to the Regions. We missed a typo on page 2, which refers to 16 facilities (Bullseye, Uroboros and 14 other similar facilities), but the list has 19. Oh, well.

Mike

From: McCabe, Janet
Sent: Thursday, February 25, 2016 7:09 PM
Subject: Portland glass facilities

Air Division Directors—

Attached is a memo in followup to the special purpose call OAQPS held yesterday about the glass facilities in Portland and beyond. Please contact Mike Koerber if you have any questions.

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Koerber, Mike
Sent: Thur 2/18/2016 3:22:34 PM
Subject: FW: Attached Image
[3360_001.pdf](#)

Thanks, Katie. Attached is a map showing the location of the NATTS. You are correct – it is NOT near Uroboros. Thanks for that edit on the letter.

Mike

From: oaqpscopier@epa.gov [mailto:oaqpscopier@epa.gov]
Sent: Thursday, February 18, 2016 10:21 AM
To: Koerber, Mike <Koerber.Mike@epa.gov>
Subject: Attached Image

	Below 0.6 (Cancer risk < 1 in 1 million)
	0.6-5 (Cancer risk 1 to 9 in 1 million)
	5-10 (Cancer risk 9 to 20 in 1 million)
	10-30 (Cancer risk 20 to 50 in 1 million)
	Above 30 (Cancer risk >50 in 1 million)

This map is not exact or precise. It uses a limited data set from October 2015 to correlate cadmium air concentrations with concentrations in moss, an approach to mapping air pollutants that is new and still developing. People should expect updates and changes to this map over time as DEQ collects additional data and the approach to mapping is refined.

February 9, 2016



To: Matthews, Julie[Matthews.Juliane@epa.gov]; McClintock, Katie[McClintock.Katie@epa.gov]
From: Leefers, Kristin
Sent: Thur 3/3/2016 8:11:52 PM
Subject: RE: any concerns about me sending this email to ODEQ regarding their request for 6S guidance?

Thanks Julie, it would be great if you can review it.

Kris

Kris Leefers

206-553-1532

From: Matthews, Julie
Sent: Thursday, March 03, 2016 11:12 AM
To: McClintock, Katie <McClintock.Katie@epa.gov>; Leefers, Kristin <Leefers.Kristin@epa.gov>
Subject: RE: any concerns about me sending this email to ODEQ regarding their request for 6S guidance?

Yep- I'm happy to look at it—or Kris if you have time we don't probably both need to.

Juliane Matthews

Assistant Regional Counsel

U.S. Environmental Protection Agency- Region 10

1200 Sixth Avenue, Suite 900, ORC -113

Seattle, WA 98101

(206) 553-1169

matthews.juliane@epa.gov

From: McClintock, Katie

Sent: Thursday, March 03, 2016 10:19 AM

To: Matthews, Julie <Matthews.Juliane@epa.gov>; Leefers, Kristin <Leefers.Kristin@epa.gov>

Subject: RE: any concerns about me sending this email to ODEQ regarding their request for 6S guidance?

Ex. 5 - Attorney Client

From: Matthews, Julie

Sent: Thursday, March 03, 2016 8:35 AM

To: Leefers, Kristin <Leefers.Kristin@epa.gov>

Cc: McClintock, Katie <McClintock.Katie@epa.gov>

Subject: RE: any concerns about me sending this email to ODEQ regarding their request for 6S guidance?

Ex. 5 - Attorney Client

Thanks for checking

Juliane Matthews

Assistant Regional Counsel

U.S. Environmental Protection Agency- Region 10

1200 Sixth Avenue, Suite 900, ORC -113

Seattle, WA 98101

(206) 553-1169

matthews.juliane@epa.gov

From: Leefers, Kristin

Sent: Thursday, March 03, 2016 8:20 AM

To: Matthews, Julie <Matthews.Juliane@epa.gov>

Cc: McClintock, Katie <McClintock.Katie@epa.gov>

Subject: FW: any concerns about me sending this email to ODEQ regarding their request for 6S guidance?

Hi Julie-

Ex. 5 - Attorney Client

Thanks,

Kris

Kris Leefers

206-553-1532

From: McClintock, Katie

Sent: Wednesday, March 02, 2016 10:52 PM

To: Leefers, Kristin <Leefers.Kristin@epa.gov>; Yellin, Patrick <Yellin.Patrick@epa.gov>

Subject: any concerns about me sending this email to ODEQ regarding their request for 6S guidance?

Attorney-client privilege, pre-decisional

Ex. 5 - Attorney Client

Katie McClintock

Air Enforcement Officer

EPA Region 10

1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov

To: McClintock, Katie[McClintock.Katie@epa.gov]
Cc: Hunter, Jeffrey (Perkins Coie)[JHunter@perkinscoie.com]; Matthews, Julie[Matthews.Juliane@epa.gov]
From: Eric Durrin
Sent: Sat 2/13/2016 7:32:30 PM
Subject: RE: Bullseye Glass

Hello Katie,

Thank you for understanding about the interruption. I'll have some information for you by the end of Wednesday.

Regards,

Eric Durrin | Bullseye Glass Co. | 503-232-8887x103

From: McClintock, Katie [mailto:McClintock.Katie@epa.gov]
Sent: Friday, February 12, 2016 9:00 PM
To: Eric Durrin
Cc: Hunter, Jeffrey (Perkins Coie); Matthews, Julie
Subject: RE: Bullseye Glass

Hi Eric –

Thanks for your voicemail and email. I found out this morning that you were meeting with DEQ about chromium so I expected there might be a slight change of plan producing our documents. When do you think you will the current records you have pulled together to me?

Also here is a prioritized list to help guide your production. My preference would be to have the first three by mid-week or earlier if possible and the last two within the next week or two after. Does this seem reasonable?

1. Size of each furnace/schematic labeled with furnace info (I imagine you are already done with this one).
2. Batch tickets for each furnace and each melt going back to 10/1/15.
3. Temperature readings at backwall for each furnace going back to 10/1/15 at whatever frequency recorded. These readings would preferably be in spreadsheet format and include the date and furnace number.
4. We forgot to ask in writing, though we did ask verbally, but we'd like you to confirm the dates each furnace was converted to oxyfuel or any other major modifications other than a brick-for-brick rebuild back to 1996.
5. Refractory materials purchased for last 3 years.

I realize you have many many balls in the air and I appreciate your cooperation.

Katie McClintock

Air Enforcement Officer

EPA Region 10

1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov

From: Eric Durrin [<mailto:ericdurrin@bullseyeglass.com>]
Sent: Friday, February 12, 2016 7:20 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Cc: Hunter, Jeffrey (Perkins Coie) <JHunter@perkinscoie.com>
Subject: Bullseye Glass

Hello,

I left you a voice message earlier today. I have been working on gathering the information that you requested. Most of yesterday, and all of today has been devoted to working with the Oregon DEQ on new developments. The unexpected interruption put a hitch in my work flow.

I am going to compile the information you asked for with the information that the DEQ has requested. For the DEQ we are routing the information through legal channels. We are taking the time to make sure the information provided is complete and accurate.

Regards,

Eric E. Durrin
Controller

Bullseye Glass Company

3722 S.E. 21st Avenue | Portland, Oregon 97202 | U.S.A.
Phone: 503-232-8887 x103 | Fax: 503-238-9963

Confidentiality Notice: This e-mail message may contain confidential or privileged information. If you have received this message by mistake, please do not review, disclose, copy, or distribute the e-mail. Please notify me immediately by replying to this message or telephoning me. Thank you.

To: Matthews, Julie[Matthews.Juliane@epa.gov]
From: McClintock, Katie
Sent: Tue 3/1/2016 5:53:17 PM
Subject: RE: Color Glass Daily Update 2-29-16

Shoot, yea I copy header and change date. Just updated.

From: Matthews, Julie
Sent: Tuesday, March 01, 2016 8:53 AM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: RE: Color Glass Daily Update 2-29-16

One more little thing- I noticed that your header on the document is still dated 2-26-16 rather than 2-29-16. Perhaps you can change the one that will be posted on one drive.

Thanks

Juliane Matthews

Assistant Regional Counsel

U.S. Environmental Protection Agency- Region 10

1200 Sixth Avenue, Suite 900, ORC -113

Seattle, WA 98101

(206) 553-1169

matthews.juliane@epa.gov

From: McClintock, Katie
Sent: Monday, February 29, 2016 10:56 PM
To: Averbach, Jonathan <Averbach.Jonathan@epa.gov>; Barber, Anthony <Barber.Anthony@epa.gov>; Barnett, Keith <Barnett.Keith@epa.gov>; Bray, Dave <Bray.Dave@epa.gov>; Bremer, Kristen <Bremer.Kristen@epa.gov>; Cunningham, Roylene

<Cunningham.Roylene@epa.gov>; Dalrymple, Anne <Dalrymple.Anne@epa.gov>; Davis, Alison <Davis.Alison@epa.gov>; Davis, Matthew <Davis.Matthew@epa.gov>; Doster, Brian <Doster.Brian@epa.gov>; Downey, Scott <Downey.Scott@epa.gov>; Fairchild, Susan <Fairchild.Susan@epa.gov>; Field, Chris <Field.Chris@epa.gov>; Fleming, Sheila <fleming.sheila@epa.gov>; Franklin, Richard <Franklin.Richard@epa.gov>; Fried, Gregory <Fried.Gregory@epa.gov>; Froikin, Sara <Froikin.Sara@epa.gov>; Hall, Chris <Hall.Christopher@epa.gov>; Hastings, Janis <Hastings.Janis@epa.gov>; Hedgpeth, Zach <Hedgpeth.Zach@epa.gov>; Holsman, Marianne <Holsman.Marianne@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Johnson, Steffan <johnson.steffan@epa.gov>; Kaetzel, Rhonda <Kaetzel.Rhonda@epa.gov>; Keenan, John <keenan.john@epa.gov>; Koerber, Mike <Koerber.Mike@epa.gov>; Koprowski, Paul <Koprowski.Paul@epa.gov>; Kowalski, Ed <Kowalski.Edward@epa.gov>; Leefers, Kristin <Leefers.Kristin@epa.gov>; Lynch, Kira <lynch.kira@epa.gov>; Martenson, Eric <Martenson.Eric@epa.gov>; Matthews, Julie <Matthews.Juliane@epa.gov>; McLerran, Dennis <mclerran.dennis@epa.gov>; Mitchell, Ken <Mitchell.Ken@epa.gov>; Moon, Wally <Moon.Wally@epa.gov>; Narvaez, Madonna <Narvaez.Madonna@epa.gov>; Owens, Katharine <Owens.Katharine@epa.gov>; Page, Lee <Page.Lee@epa.gov>; Palma, Ted <Palma.Ted@epa.gov>; Pirzadeh, Michelle <Pirzadeh.Michelle@epa.gov>; Rimer, Kelly <Rimer.Kelly@epa.gov>; Rodman, Sonja <Rodman.Sonja@epa.gov>; Smith, Judy <Smith.Judy@epa.gov>; Stern, Allyn <Stern.Alyn@epa.gov>; Stewart, Michael <Stewart.Michael@epa.gov>; Stifelman, Marc <Stifelman.Marc@epa.gov>; Taylor, Kevin <Taylor.Kevin@epa.gov>; Terada, Calvin <Terada.Calvin@epa.gov>; Terry, Sara <Terry.Sara@epa.gov>; Thrift, Mike <thrift.mike@epa.gov>; Throwe, Scott <Throwe.Scott@epa.gov>; Tonel, Monica <Tonel.Monica@epa.gov>; Wendel, Arthur <Wendel.Arthur@epa.gov>; Williamson, Ann <Williamson.Ann@epa.gov>; Wroble, Julie <Wroble.Julie@epa.gov>; Yellin, Patrick <Yellin.Patrick@epa.gov>

Subject: Color Glass Daily Update 2-29-16

Here is the daily update for the day and the link the onedrive below. I've heard some people are having trouble with access. Let me know if that happens as we might be using the onedrive for FOIA data collection and we will need everyone to have access. Please also give let me know of anyone not in this email who might have responsive FOIA documents.

https://usepa-my.sharepoint.com/personal/mcclintock_katie_epa_gov/Documents/Colored%20Glass

Katie McClintock

Air Enforcement Officer

EPA Region 10

1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov

To: Eric Durrin[ericdurrin@bullseyeglass.com]
Cc: Hunter, Jeffrey (Perkins Coie)[JHunter@perkinscoie.com]; Matthews, Julie[Matthews.Juliane@epa.gov]
From: McClintock, Katie
Sent: Sat 2/13/2016 4:59:30 AM
Subject: RE: Bullseye Glass

Hi Eric –

Thanks for your voicemail and email. I found out this morning that you were meeting with DEQ about chromium so I expected there might be a slight change of plan producing our documents. When do you think you will the current records you have pulled together to me?

Also here is a prioritized list to help guide your production. My preference would be to have the first three by mid-week or earlier if possible and the last two within the next week or two after. Does this seem reasonable?

1. Size of each furnace/schematic labeled with furnace info (I imagine you are already done with this one).
2. Batch tickets for each furnace and each melt going back to 10/1/15.
3. Temperature readings at backwall for each furnace going back to 10/1/15 at whatever frequency recorded. These readings would preferably be in spreadsheet format and include the date and furnace number.
4. We forgot to ask in writing, though we did ask verbally, but we'd like you to confirm the dates each furnace was converted to oxyfuel or any other major modifications other than a brick-for-brick rebuild back to 1996.
5. Refractory materials purchased for last 3 years.

I realize you have many many balls in the air and I appreciate your cooperation.

Katie McClintock

Air Enforcement Officer

EPA Region 10

1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov

From: Eric Durrin [mailto:ericdurrin@bullseyeglass.com]
Sent: Friday, February 12, 2016 7:20 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Cc: Hunter, Jeffrey (Perkins Coie) <JHunter@perkinscoie.com>
Subject: Bullseye Glass

Hello,

I left you a voice message earlier today. I have been working on gathering the information that you requested. Most of yesterday, and all of today has been devoted to working with the Oregon DEQ on new developments. The unexpected interruption put a hitch in my work flow.

I am going to compile the information you asked for with the information that the DEQ has requested. For the DEQ we are routing the information through legal channels. We are taking the time to make sure the information provided is complete and accurate.

Regards,

Eric E. Durrin
Controller

Bullseye Glass Company

3722 S.E. 21st Avenue | Portland, Oregon 97202 | U.S.A.

Phone: 503-232-8887 x103 | Fax: 503-238-9963

Confidentiality Notice: This e-mail message may contain confidential or privileged information. If you have received this message by mistake, please do not review, disclose, copy, or distribute the e-mail. Please notify me immediately by replying to this message or telephoning me. Thank you.

***** ATTACHMENT REMOVED *****

This message contained an attachment which the administrator has caused to be removed.

***** ATTACHMENT REMOVED *****

Attachment name: [image001.jpg]
Attachment type: [image/jpeg]

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Matthews, Julie
Sent: Tue 3/1/2016 4:53:07 PM
Subject: RE: Color Glass Daily Update 2-29-16

One more little thing- I noticed that your header on the document is still dated 2-26-16 rather than 2-29-16. Perhaps you can change the one that will be posted on one drive.

Thanks

Juliane Matthews

Assistant Regional Counsel

U.S. Environmental Protection Agency- Region 10

1200 Sixth Avenue, Suite 900, ORC -113

Seattle, WA 98101

(206) 553-1169

matthews.juliane@epa.gov

From: McClintock, Katie

Sent: Monday, February 29, 2016 10:56 PM

To: Averbach, Jonathan <Averbach.Jonathan@epa.gov>; Barber, Anthony <Barber.Anthony@epa.gov>; Barnett, Keith <Barnett.Keith@epa.gov>; Bray, Dave <Bray.Dave@epa.gov>; Bremer, Kristen <Bremer.Kristen@epa.gov>; Cunningham, Roylene <Cunningham.Roylene@epa.gov>; Dalrymple, Anne <Dalrymple.Anne@epa.gov>; Davis, Alison <Davis.Alison@epa.gov>; Davis, Matthew <Davis.Matthew@epa.gov>; Doster, Brian <Doster.Brian@epa.gov>; Downey, Scott <Downey.Scott@epa.gov>; Fairchild, Susan <Fairchild.Susan@epa.gov>; Field, Chris <Field.Chris@epa.gov>; Fleming, Sheila <fleming.sheila@epa.gov>; Franklin, Richard <Franklin.Richard@epa.gov>; Fried, Gregory <Fried.Gregory@epa.gov>; Froikin, Sara <Froikin.Sara@epa.gov>; Hall, Chris <Hall.Christopher@epa.gov>; Hastings, Janis <Hastings.Janis@epa.gov>; Hedgpeth, Zach <Hedgpeth.Zach@epa.gov>; Holsman, Marianne <Holsman.Marianne@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Johnson, Steffan <johnson.steffan@epa.gov>; Kaetzel, Rhonda <Kaetzel.Rhonda@epa.gov>; Keenan, John <keenan.john@epa.gov>; Koerber, Mike <Koerber.Mike@epa.gov>; Koprowski, Paul <Koprowski.Paul@epa.gov>; Kowalski, Ed

<Kowalski.Edward@epa.gov>; Leefers, Kristin <Leefers.Kristin@epa.gov>; Lynch, Kira <lynch.kira@epa.gov>; Martenson, Eric <Martenson.Eric@epa.gov>; Matthews, Julie <Matthews.Juliane@epa.gov>; McLerran, Dennis <mclerran.dennis@epa.gov>; Mitchell, Ken <Mitchell.Ken@epa.gov>; Moon, Wally <Moon.Wally@epa.gov>; Narvaez, Madonna <Narvaez.Madonna@epa.gov>; Owens, Katharine <Owens.Katharine@epa.gov>; Page, Lee <Page.Lee@epa.gov>; Palma, Ted <Palma.Ted@epa.gov>; Pirzadeh, Michelle <Pirzadeh.Michelle@epa.gov>; Rimer, Kelly <Rimer.Kelly@epa.gov>; Rodman, Sonja <Rodman.Sonja@epa.gov>; Smith, Judy <Smith.Judy@epa.gov>; Stern, Allyn <Stern.Allyn@epa.gov>; Stewart, Michael <Stewart.Michael@epa.gov>; Stifelman, Marc <Stifelman.Marc@epa.gov>; Taylor, Kevin <Taylor.Kevin@epa.gov>; Terada, Calvin <Terada.Calvin@epa.gov>; Terry, Sara <Terry.Sara@epa.gov>; Thrift, Mike <thrift.mike@epa.gov>; Throwe, Scott <Throwe.Scott@epa.gov>; Tonel, Monica <Tonel.Monica@epa.gov>; Wendel, Arthur <Wendel.Arthur@epa.gov>; Williamson, Ann <Williamson.Ann@epa.gov>; Wroble, Julie <Wroble.Julie@epa.gov>; Yellin, Patrick <Yellin.Patrick@epa.gov>

Subject: Color Glass Daily Update 2-29-16

Here is the daily update for the day and the link the onedrive below. I've heard some people are having trouble with access. Let me know if that happens as we might be using the onedrive for FOIA data collection and we will need everyone to have access. Please also give let me know of anyone not in this email who might have responsive FOIA documents.

https://usepa-my.sharepoint.com/personal/mcclintock_katie_epa_gov/Documents/Colored%20Glass

Katie McClintock

Air Enforcement Officer

EPA Region 10

1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Matthews, Julie
Sent: Mon 2/29/2016 9:39:14 PM
Subject: Fwd: Reply to your email to the EPA

Sent from my iPhone

Begin forwarded message:

From: "Hastings, Janis" <Hastings.Janis@epa.gov>
Date: February 29, 2016 at 11:48:05 AM PST
To: "Downey, Scott" <Downey.Scott@epa.gov>, "Moon, Wally" <Moon.Wally@epa.gov>
Cc: "Fleming, Sheila" <flaming.sheila@epa.gov>, "Kowalski, Ed" <Kowalski.Edward@epa.gov>, "Matthews, Julie" <Matthews.Juliane@epa.gov>
Subject: FW: Reply to your email to the EPA

FYI

From: Barber, Anthony
Sent: Monday, February 22, 2016 3:57 PM
To: Smith, Judy <Smith.Judy@epa.gov>; Holsman, Marianne <Holsman.Marianne@epa.gov>; Hastings, Janis <Hastings.Janis@epa.gov>
Subject: FW: Reply to your email to the EPA

Here is the email that I just sent out to 8 people who have recently contacted us regarding Portland air toxics issues.

From: Barber, Anthony
Sent: Monday, February 22, 2016 3:55 PM
To: Barber, Anthony <Barber.Anthony@epa.gov>
Subject: Reply to your email to the EPA

Hello,

Thank you for your recent email to the U.S. Environmental Protection Agency, Region 10. We appreciate you taking the time to write to us about the metals emissions in Portland and making us aware of your concerns. As a member of the greater Portland community, I take air toxics concerns here seriously. We are working with the Oregon Department of Environmental Quality and others to help you and your community get the information you need and to help find solutions.

The Oregon Department of Environmental Quality found a significant “hot spot” of cadmium and arsenic during air sampling in Portland, Oregon near SE 22nd Ave. and Powell Blvd. DEQ is collecting additional air and soil samples in the affected area, and is working collaboratively with county, state and federal health agencies (Oregon Health Authority, Multnomah County Health Department, and the Agency for Toxic Substances and Disease Registry) to assess and mitigate impacts to public health. EPA is keeping fully informed about this developing situation and is ready to support and assist ODEQ as needed. EPA and ATSDR are evaluating these findings in relation to EPA health standards.

Additional information, including a link to air sampling data and a map of the affected area, can be found at: <http://www.deq.state.or.us/nwr/metalsemissions.htm>. DEQ's initial findings are that the monthly average is 49 times greater than the state air toxics benchmark for cadmium and 159 times the state air toxics benchmark for arsenic. Also, here are two links to The Oregon Health Authority's web pages that include more information such as fact sheets on health concerns, gardening, information for health care providers, and more:

<https://public.health.oregon.gov/newsadvisories/Pages/metals-emissions.aspx>.

https://public.health.oregon.gov/HealthyEnvironments/HealthyNeighborhoods/Documents/OHA_Healthy_Gar

At the bottom of this email I'm including a few Q&As that may be helpful to you. I've added you to my e-mail list and I will let you know when new information is available from EPA. Again, thank you for contacting the EPA. If you have any questions, please feel free to contact me.

Sincerely,

Anthony L. Barber, PE
Director
Oregon Operations Office
US EPA Region 10

805 SW Broadway, Suite 500
Portland, OR 97205

503-326-6890 (phone)
503-326-3399 (fax)
barber.anthony@epa.gov

Some Questions and Answers

How is EPA involved and what is our role?

EPA Region 10 was briefed by DEQ one-week prior to their February 3, 2016 press release. DEQ is the lead agency for implementing the Clean Air Act in Oregon and we are supporting their efforts.

EPA Region 10 jointly inspected Bullseye Glass and Uroboros Glass facilities with DEQ on February 10, to better understand the processes being used and the pollution controls currently in place. This information will help us determine if further action is appropriate under EPA authority.

We are reviewing records to identify other potential sources in the affected area. Federal regional screening levels (RSL) are being compared with the DEQ state health benchmarks in relation to the amount of contamination found in the study to better understand the health impact. EPA continues to support the DEQ, OHA, MCHD and ATSDR efforts to assess, monitor and communicate information as it becomes available.

Are we determining or confirming the air pollution and/or the source?

ODEQ is keeping EPA informed of their actions to monitor the situation and exposure levels. DEQ conducted air monitoring at nearby schools and day care centers. DEQ is conducting additional air and soil sampling is getting underway. EPA is providing DEQ

with additional high volume air sampling equipment and filters to support this effort.

What federal air regulations apply to glass manufacturing facilities?

EPA has three national standards that potentially apply to glass manufacturing plants. Whether a standard applies can depend on a number of factors, such as startup date, type of furnace, and the amount of glass produced.

- A National Emissions Standards for Inorganic Arsenic Emissions from Glass Manufacturing Plants (issued in 1986), which set emissions limits of 2.7 tons per year for arsenic, or 85 percent control for existing glass-melting furnaces; for new or modified glass melting furnaces, the limit is 0.44 tons or 85 percent control.
- Standards of Performance for Glass Manufacturing Plants (issued in 1980), which set performance standards to limit emissions particulate matter (PM). Limiting particulate matter also limits emissions of lead and other toxic metals.

A 2007 National Emissions Standard Hazardous Air Pollutants for Glass Manufacturing Area Sources, which sets emissions limits for plants that emit less than 10 tons a year of a single air toxic, or less than 25 tons a year of a combination of toxics. Manufacturers subject to the 2007 standards must meet either a PM limit of 0.2 pounds of PM per ton of glass produced, or a limit of 0.02 pounds of metal air toxics per ton of glass produced.

What type of pollution controls should glass manufacturers use?

Because glass melts at a very high temperature, a glass facility would need to use multiple steps to control their metal emissions – including changing the pollutants from a vapor to a particle using cooling or specialized sorbents and then removing the particles using a control device such as an electrostatic precipitator or a baghouse.

Design of controls for these facilities is customized and complex and may include multiple types of control equipment based on the types of glass the facility is making and the pollutants the processes emit.

Do we know any more about the USFS role or study mentioned in the news media?

The study was a collaborative effort between US Forest Service and DEQ to better understand the sources and distribution of toxic metals, including arsenic and cadmium, air pollution in Portland. EPA has requested a copy of the study as soon as it is published.

To: McClintock, Katie[McClintock.Katie@epa.gov]
Cc: Smith, Judy[Smith.Judy@epa.gov]
From: Matthews, Julie
Sent: Wed 2/24/2016 10:15:27 PM
Subject: FW: Metals Release - Media Monitoring Report 02.22.16
Media Monitoring Report Metal Release 02.22.2016.docx

Here you go Katie.

Judy will you add Katie McClintock in region 10 to your address list please.

thanks

Juliane Matthews

Assistant Regional Counsel

U.S. Environmental Protection Agency- Region 10

1200 Sixth Avenue, Suite 900, ORC -113

Seattle, WA 98101

(206) 553-1169

matthews.juliane@epa.gov

From: Smith, Judy

Sent: Monday, February 22, 2016 2:53 PM

To: Holsman, Marianne <Holsman.Marianne@epa.gov>; Downey, Scott <Downey.Scott@epa.gov>; Leefers, Kristin <Leefers.Kristin@epa.gov>; Bray, Dave <Bray.Dave@epa.gov>; Narvaez, Madonna <Narvaez.Madonna@epa.gov>; Fairchild, Susan <Fairchild.Susan@epa.gov>; Hastings, Janis <Hastings.Janis@epa.gov>; Froikin, Sara <Froikin.Sara@epa.gov>; Matthews, Julie <Matthews.Juliane@epa.gov>; Franklin, Richard <Franklin.Richard@epa.gov>; Kowalski, Ed <Kowalski.Edward@epa.gov>; Wroble, Julie <Wroble.Julie@epa.gov>; Hall, Chris <Hall.Christopher@epa.gov>; Moon, Wally <Moon.Wally@epa.gov>; Fried, Gregory <Fried.Gregory@epa.gov>; McLerran, Dennis <mclerran.dennis@epa.gov>; Pirzadeh, Michelle <Pirzadeh.Michelle@epa.gov>; Koprowski, Paul <Koprowski.Paul@epa.gov>; Hedgpeth, Zach <Hedgpeth.Zach@epa.gov>; Fleming, Sheila <fleming.sheila@epa.gov>; Field, Chris <Field.Chris@epa.gov>; Martenson, Eric

<Martenson.Eric@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Terada, Calvin
<Terada.Calvin@epa.gov>; Barnett, Keith <Barnett.Keith@epa.gov>; Kaetzel, Rhonda
<Kaetzel.Rhonda@epa.gov>; Wendel, Arthur <Wendel.Arthur@epa.gov>; Koerber, Mike
<Koerber.Mike@epa.gov>

Subject: FW: Metals Release - Media Monitoring Report 02.22.16

Here is the latest media monitoring report compiled by the Oregon Health Authority. It covers
the past 72 hours. Judy

Media Monitoring Report – Metal Release

Social and Traditional Media

February 19-22, 2016

Good Morning –

This is a situation specific media monitoring report relating to the Portland metals release. This report contains both traditional and social media sources.

Danielle on behalf of the HSPR Team

Traditional Media

Political

- [Group heads to Salem to protest neighborhood air pollution](#) (Portland Tribune)
- [Hales, Kafoury demand state action on air pollution](#)
- [Sen. Wyden: Major loophole allowed Portland pollution](#) (The Columbian)
- [Portland leaders criticize state pollution response](#) (Washington Times)
- [Portland leaders criticize state response to pollution](#) (Bend Bulletin)
- [Portland-Area Leaders Say They'll Create Local Air Agency, If DEQ Doesn't Act](#) (Jefferson Public Radio)

Environment

- [Warning: Don't eat produce grown near toxic hot spots](#) (KGW)
- [New soil testing conducted for toxic metals in neighborhoods](#) (KATU)
- [Portland's toxic air: What you need to know about pollution hot spots](#) (Oregonian)
- [Nickel found in SE Portland moss could be health risk](#) (KOIN6)
- [Portland's toxic hotspots discovered as an after-thought](#) (Oregonian)

Community health

- [Son OK, but mom is 'concerned for Portland air'](#) (KOIN6)
- [Portland pollution: How does it affect you?](#) (Oregonian)
- [Portland pollution discovered almost as afterthought](#) (The Register-Guard/AP)
- [SE Portland residents channel anger into action](#) (KOIN6)
- [Portland pollution discovered almost as afterthought](#) (Statesman Journal/AP)

Schools

- [How Bad Is The Air At Portland Schools? Good Question](#) (OPB)

Local University Activity

- [Toxic levels of arsenic found in Portland's southeast quadrant](#) (The Pioneer Log – Lewis & Clark College)
- [Reed College Cancels Ritual Plane Burning, Citing Air Quality Concerns](#) (OPB)

Related topics

- [Winds blow small amounts of radiation onto highway \(Statesman Journal\)](#)
- [CDC says it underestimated cancer risk from Lumber Liquidators flooring \(OPB\)](#)

Blog

- [Portland Glass Makers' Fluorine Use Deserves Scrutiny, Experts Say \(Portland Mercury\)](#)

Social Media

Online Groups – What they are discussing within the last 24 hours

- [Neighbors for Clean Air Facebook.](#)
 - **Comments:**
 - Unhealthy levels of Cadmium and Arsenic have been measured in North Portland air for over a decade. Link to [KOIN6 article](#).
 - True in Flint, true in Portland. "Race best predicts whether you live near pollution." Link to [The Nation article](#).
 - SIGN THE PETITION: Hold Oregon DEQ accountable! Keep our air safe. (They are delivering the petition to Salem Tuesday 1/23). Link to [petition and trip to Salem info](#).
 - When regulators start speaking the same language that people on the fence line of industry have been speaking for years: our children's health is caught in the blind spot of the Clean Air Act: "Pedersen called the levels of cadmium and arsenic detected in Southeast Portland "alarming" and "very, very high." He said the federal Clean Air Act the state enforces to regulate toxic pollutants is not enough." Yes! Link to [OPB article](#).
- [Eastside Portland Air Coalition \(A.K.A Inner SE/NE Air Quality\)](#)
 - **Comments:**
 - What if manufacturing colored glass just isn't safe? Like lead paint?
 - I want to say something that may very well get me flamed, but it's cautionary. Please, as a group, be very careful about letting vigilantism become the rhetoric. I think there is a lot of power in this group, but the more I see this movement move toward an attack against people, the more turned off I get, and I don't think that is the goal. That will kill the power of this group.
 - SO great to connect some faces with names and comments. Thank you! I came away with a lot of ideas about how I can support what is happening here. Again, thank you. Have we settled on a hashtag yet? (Or a couple)? [#airmatters](#) [#EPAC2016](#) [#EPAC](#) [#breathclean](#) [#cleanairpdx](#) [#cleanairmatters](#) Are some off the top of my head.

Hashtags

- It does not yet appear that any one hashtag has been adopted for this issue.
 - Eastside Portland Air Coalition group is discussing the following options:

- #airmatters
- #EPAC2016
- #EPAC
- #breathclean
- #cleanairpdx
- #cleanairmatters
- #filtrateorvacate
- #bagthatstack

From: McClintock, Katie
Location: km call jm - i'll be at home
Importance: Normal
Subject: checkin
Start Date/Time: Wed 2/24/2016 10:00:00 PM
End Date/Time: Wed 2/24/2016 10:30:00 PM

6s
Northstar
Bullseye
Other companies

To: Matthews, Julie[Matthews.Juliane@epa.gov]
From: McClintock, Katie
Sent: Thur 2/18/2016 3:49:17 AM
Subject: RE: Metal monitoring in moss in SE Portland

Thank you. This is the power point I was mentioning. I still haven't seen the actual study come through.

From: Matthews, Julie
Sent: Wednesday, February 17, 2016 8:25 AM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: FW: Metal monitoring in moss in SE Portland

Katie- see the link below to the moss study.

Juliane Matthews

Assistant Regional Counsel

U.S. Environmental Protection Agency- Region 10

1200 Sixth Avenue, Suite 900, ORC -113

Seattle, WA 98101

(206) 553-1169

matthews.juliane@epa.gov

From: Matthews, Julie
Sent: Thursday, February 04, 2016 11:47 AM
To: Leefers, Kristin <leefers.kristin@epa.gov>
Subject: FW: Metal monitoring in moss in SE Portland

This is the moss study report

Juliane Matthews

Assistant Regional Counsel

U.S. Environmental Protection Agency- Region 10

1200 Sixth Avenue, Suite 900, ORC -113

Seattle, WA 98101

(206) 553-1169

matthews.juliane@epa.gov

From: Elleman, Robert

Sent: Wednesday, February 03, 2016 4:07 PM

To: Downey, Scott <Downey.Scott@epa.gov>; Matthews, Julie <Matthews.Juliane@epa.gov>; Hastings, Janis <Hastings.Janis@epa.gov>; Suzuki, Debra <Suzuki.Debra@epa.gov>; Dossett, Donald <Dossett.Donald@epa.gov>; Bray, Dave <Bray.Dave@epa.gov>

Cc: Islam, Mahbubul <Islam.Mahbubul@epa.gov>

Subject: Metal monitoring in moss in SE Portland

http://www.lar.wsu.edu/nw-airquest/docs/20150624_meeting/20150625_Donovan_moss.pdf

Robert Elleman

Meteorologist

EPA Region 10, Seattle

(206) 553-1531

elleman.robert@epa.gov

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Eric Lovell
Sent: Fri 2/19/2016 6:00:43 PM
Subject: RE: Request for confidentiality procedures

Ok, great, thanks! I'm on it!

From: McClintock, Katie [mailto:McClintock.Katie@epa.gov]
Sent: Friday, February 19, 2016 9:57 AM
To: Eric Lovell
Subject: RE: Request for confidentiality procedures

Thanks Eric.

Let's start with what you have for the refractories and I will let you know if I need more. It sounds like what you have contains the info I am looking for.

From: Eric Lovell [mailto:eric@uroboros.com]
Sent: Friday, February 19, 2016 9:35 AM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: RE: Request for confidentiality procedures

Yes, Katie. Did receive, thank you. Have not yet been able to find, let alone read, all the various regulations cited however. Thanks for confirming deletion of the sample documents.

Depending on further distractions from local regulators, media management issues, etc., I hope to get an email out to you this morning with a start on the non-CBI information you requested, with paper copies of further info into today's mail. We are still accumulating the CBI documents and will have them ready as soon as we are comfortable with the EPAs and DEQs ability to protect them as long as they have them in their possession.

Question for you re: furnace refractories. I have on hand technical data sheets from the refractory

suppliers for the types we are using. These list the material compositions, density, porosity, etc. Will these suffice for you to confirm the materials we are using, or do you need MSDS for each one?

Sincerely,

Eric L.

From: McClintock, Katie [<mailto:McClintock.Katie@epa.gov>]
Sent: Thursday, February 18, 2016 7:43 PM
To: Eric Lovell
Subject: RE: Request for confidentiality procedures

Eric –

I wanted to confirm that you received this and also confirm with you that we have deleted the email you sent earlier from our server as we will with any CBI emailed to us.

Katie

From: McClintock, Katie
Sent: Thursday, February 18, 2016 11:50 AM
To: 'Eric Lovell' <eric@uroboros.com>
Subject: RE: Request for confidentiality procedures

Eric:

The U.S. EPA regulations governing the receipt and handling of Confidential Business Information (CBI) are found in Title 40 of the Code of Federal Regulations (40 CFR) in Part 2, subpart B, 40 CFR §§ 2.201-2.215. Special rules governing CBI information obtained under various environmental statutes follow at 40 C.F.R. §§ 2.301-2.311 with § 2.301 being specific to CAA CBI.

In summary the regulations provide that when EPA requires a facility, like yours, to provide information to it, you are entitled to assert a claim of business confidentiality, covering all or any required information, in the manner described at 40 C.F.R. § 2.203(b).

This section explains that to assert a business confidentiality claim, you should place on (or attach to) all information you desire to assert as business confidential either a cover sheet, stamped or typed legend, or other suitable form of notice employing language such as "trade secret," "proprietary," or "company confidential" at the time you submit your response to this information request. Allegedly confidential portions of otherwise non-confidential documents should be clearly identified, and may be submitted separately to facilitate identification and handling by EPA. You should indicate if you desire confidential treatment only until a certain date or until the occurrence of a certain event. Failure to furnish a business confidentiality claim with submitted information will be construed as a waiver of that claim, and the information may be made available to the public without further notice to you.

Information covered by a claim of business confidentiality will be disclosed by EPA only to the extent, and by means of the procedures, set forth in Section 114(c) of the Act and 40 C.F.R. Part 2, subpart B. The regulations describe the procedure and the criteria that EPA will use to safeguard the information from unauthorized disclosure and to determine whether specific information is entitled to confidentiality. The regulations also provide that should EPA determine that information is not entitled to confidential treatment, the submitter of the information has the opportunity to challenge that decision prior to the information being released. Note that emission data, which includes information necessary to determine the identity, amount, frequency, concentration, or other characteristics (to the extent related to air quality) of emission data, are not entitled to confidential treatment.

Information subject to a claim of business confidentiality will be made available to the public only in accordance with the procedures set forth at 40 C.F.R. Part 2, Subpart B.

Let me know if you have any further questions.

Katie McClintock

Air Enforcement Officer

EPA Region 10

1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov

From: Eric Lovell [<mailto:eric@uroboros.com>]
Sent: Wednesday, February 17, 2016 11:26 AM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: Request for confidentiality procedures

Dear Ms. McClintock,

As we are preparing copies of our glass formulas to meet your request, I would like to have a letter on EPA stationery, over your signature and title, that describes how EPA intends to protect the confidentiality of them prior to the handover.

I realize we discussed confidentiality verbally during your visit, but due to the extremely valuable intellectual property embodied in these glass formulas and furnace designs, I am uncomfortable releasing them to EPA custody based solely on a verbal description of confidentiality procedures. These formulas and designs are unique in the world, are the life blood of this business and are of vital importance to us.

Therefore, if you would then please provide in written form (electronic delivery accepted), exactly how the department intends to protect the confidentiality of the documents from date of receipt until the date of destruction, which offices will have access to them during that time, how long they will be retained before they are not needed, and how they will be destroyed when no longer needed. Perhaps the EPA already has a printed document available that covers this. I am particularly concerned about EPA sharing with the Oregon DEQ, since public access rules in Oregon allow for almost complete release of all DEQ documents.

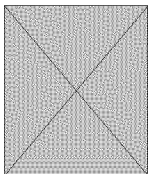
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Thank you very much for your attention to this request. We are continuing to make copies of the batch tickets so they are ready to send as soon as I receive your letter. We can send the weekly melt plans ahead in the meantime.

Eric

Eric Lovell

President



2139 N. Kerby Ave
Portland, OR 97227
503-284-4900 x 201 T
503-284-7584 F

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Eric Lovell
Sent: Fri 2/19/2016 5:35:13 PM
Subject: RE: Request for confidentiality procedures

Yes, Katie. Did receive, thank you. Have not yet been able to find, let alone read, all the various regulations cited however. Thanks for confirming deletion of the sample documents.

Depending on further distractions from local regulators, media management issues, etc., I hope to get an email out to you this morning with a start on the non-CBI information you requested, with paper copies of further info into today's mail. We are still accumulating the CBI documents and will have them ready as soon as we are comfortable with the EPAs and DEQs ability to protect them as long as they have them in their possession.

Question for you re: furnace refractories. I have on hand technical data sheets from the refractory suppliers for the types we are using. These list the material compositions, density, porosity, etc. Will these suffice for you to confirm the materials we are using, or do you need MSDS for each one?

Sincerely,

Eric L.

From: McClintock, Katie [mailto:McClintock.Katie@epa.gov]
Sent: Thursday, February 18, 2016 7:43 PM
To: Eric Lovell
Subject: RE: Request for confidentiality procedures

Eric –

I wanted to confirm that you received this and also confirm with you that we have deleted the email you sent earlier from our server as we will with any CBI emailed to us.

Katie

From: McClintock, Katie
Sent: Thursday, February 18, 2016 11:50 AM
To: 'Eric Lovell' <eric@uroboros.com>
Subject: RE: Request for confidentiality procedures

Eric:

The U.S. EPA regulations governing the receipt and handling of Confidential Business Information (CBI) are found in Title 40 of the Code of Federal Regulations (40 CFR) in Part 2, subpart B, 40 CFR §§ 2.201-2.215. Special rules governing CBI information obtained under various environmental statutes follow at 40 C.F.R. §§ 2.301-2.311 with § 2.301 being specific to CAA CBI.

In summary the regulations provide that when EPA requires a facility, like yours, to provide information to it, you are entitled to assert a claim of business confidentiality, covering all or any required information, in the manner described at 40 C.F.R. § 2.203(b).

This section explains that to assert a business confidentiality claim, you should place on (or attach to) all information you desire to assert as business confidential either a cover sheet, stamped or typed legend, or other suitable form of notice employing language such as "trade secret," "proprietary," or "company confidential" at the time you submit your response to this information request. Allegedly confidential portions of otherwise non-confidential documents should be clearly identified, and may be submitted separately to facilitate identification and handling by EPA. You should indicate if you desire confidential treatment only until a certain date or until the occurrence of a certain event. Failure to furnish a business confidentiality claim with submitted information will be construed as a waiver of that claim, and the information may be made available to the public without further notice to you.

Information covered by a claim of business confidentiality will be disclosed by EPA only to the extent, and by means of the procedures, set forth in Section 114(c) of the Act and 40 C.F.R. Part 2, subpart B. The regulations describe the procedure and the criteria that EPA will use to safeguard the information from unauthorized disclosure and to determine whether specific information is entitled to confidentiality. The regulations also provide that should EPA determine that information is not entitled to confidential

treatment, the submitter of the information has the opportunity to challenge that decision prior to the information being released. Note that emission data, which includes information necessary to determine the identity, amount, frequency, concentration, or other characteristics (to the extent related to air quality) of emission data, are not entitled to confidential" treatment.

Information subject to a claim of business confidentiality will be made available to the public only in accordance with the procedures set forth at 40 C.F.R. Part 2, Subpart B.

Let me know if you have any further questions.

Katie McClintock

Air Enforcement Officer

EPA Region 10

1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov

From: Eric Lovell [<mailto:eric@uroboros.com>]
Sent: Wednesday, February 17, 2016 11:26 AM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: Request for confidentiality procedures

Dear Ms. McClintock,

As we are preparing copies of our glass formulas to meet your request, I would like to have a letter on EPA stationary, over your signature and title, that describes how EPA intends to protect the confidentiality of them prior to the handover.

I realize we discussed confidentiality verbally during your visit, but due to the extremely valuable intellectual property embodied in these glass formulas and furnace designs, I am uncomfortable releasing them to EPA custody based solely on a verbal description of confidentiality procedures. These formulas and designs are unique in the world, are the life blood of this business and are of vital importance to us.

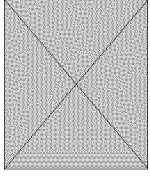
Therefore, if you would then please provide in written form (electronic delivery accepted), exactly how the department intends to protect the confidentiality of the documents from date of receipt until the date of destruction, which offices will have access to them during that time, how long they will be retained before they are not needed, and how they will be destroyed when no longer needed. Perhaps the EPA already has a printed document available that covers this. I am particularly concerned about EPA sharing with the Oregon DEQ, since public access rules in Oregon allow for almost complete release of all DEQ documents.

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Eric

Eric Lovell
President



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Portland, OR 97227
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503-284-7584 F

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Eric Lovell
Sent: Wed 2/17/2016 7:26:08 PM
Subject: Request for confidentiality procedures
[removed.txt](#)

Dear Ms. McClintock,

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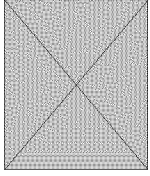
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